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POTENTIAL OF BLM LANDS IN WESTERN FRESNO AND EASTERN SAN BENITO AND MONTEREY COUNTIES, CALIFORNIA, AS CRITICAL HABITATS FOR THE ENDANGERED SAN JOAQUIN KIT FOX, Vulpes macrotis mutica, AND BLUNT-NOSED LEOPARD LIZARD, Crotaphytus silus

NOVEMBER 1981

PREPARED FOR THE BUREAU OF LAND MANAGEMENT,
U.S. DEPARTMENT OF THE INTERIOR

SANTA BARBARA OPERATIONS
EG&G INC., 130 ROBIN HILL RD., GOLETA, CALIF. 93017

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by

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NOVEMBER 1981

This report is unclassified: John Borella
Classification Officer

PREPARED FOR THE BUREAU OF LAND MANAGEMENT,
U.S. DEPARTMENT OF THE INTERIOR

THROUGH INTERAGENCY AGREEMENT CA-010-IA1-11 WITH THE
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SANTA BARBARA OPERATIONS
EG&G INC., 130 ROBIN HILL RD., GOLETA, CALIF. 93017

SUMMARY

The major objectives of this project were to determine the presence and relative density of the San Joaquin kit fox and blunt-nosed leopard lizard on BLM lands in western Fresno and eastern San Benito and Monterey counties, California, and to determine the potential of these lands as critical habitat for these endangered species. A total of 6,220 acres in the Ciervo Hills and 4,000 acres near Coalinga were surveyed for both San Joaquin kit fox and blunt-nosed leopard lizards; 810 acres in the Griswold Hills were surveyed for kit fox only; and 2,000 acres in the Tumey Hills were surveyed for blunt-nosed leopard lizards only.

A total of 2,440 acres near San Ardo in the Salinas Valley was deleted from the survey afterpreliminary investigation indicated low potential as habitat for the kit fox because of rugged topography. Parcels in the Coalinga and San Ardo areas consisted of privately-owned surface with federally-owned subsurface mineral rights. Other parcels were vacant public lands.

Eight line transects per mile were used to gather information on 1) kit fox dens, scats, tracks, and remains of their prey; 2) presence of blunt-nosed leopard lizards; 3) vegetation associations; 4) density of rodent burrows on lands surveyed for leopard lizards; 5) topography; 6) evidence of human activities; 7) presence of other wildlife species; and 8) any additional scientific data related to endangered species. Night spotlight surveys were conducted in the Ciervo Hills, Griswold Hills, and on lands adjacent to Coalinga and San Ardo to document presence of kit fox, their potential prey, and other vertebrates.

BLM parcels were arranged into four land units: Ciervo Hills, Griswold Hills, Coalinga, and Tumey Hills. Field data gathered during surveys of the first three land units were evaluated using a numerical rating system. Scores were given to each land unit for presence of San Joaquin kit fox, evidence of breeding, abundance of prey (lagomorphs), space, suitability of topography, and impacts of grazing and oil developments. Final scores of the rating system were used to rank the suitability of each land unit as potential critical habitat for the San Joaquin kit fox. Potential of land units as critical habitat for the blunt-nosed leopard lizard was evaluated using information on 1) presence of the species, 2) perceived suitability of vegetation associations and physiography, and 3) compatibility of human activities in the area.

Of BLM land surveyed in 1981, the Coalinga Land Unit had the highest potential as critical habitat for the San Joaquin kit fox, the Ciervo Hills Land Unit was ranked second, and parcels in the Griswold Hills received the lowest score given since inventories were initiated in 1979. Public lands in the Salinas Valley were too steep to serve as habitat for kit fox.

Over 70% of the parcels had only fair to no potential as critical habitat for the blunt-nosed leopard lizard. BLM lands near Coalinga and those in the central plateau of the Tumey Hills visually appeared to have some potential as

habitat for the species. Further rankings could not be assigned since only one blunt-nosed leopard lizard was observed during field surveys. Because of the insufficient number of observations, no attempt was made to relate presence of leopard lizards to vegetation associations, density of rodent burrows, proportion of open ground, topography, or human impacts such as grazing or petroleum developments.

Twenty nine kit fox dens were found. The estimated relative density (number/1000 acres) of kit fox dens for all land units combined was 2.6, but no dens were found in the Griswold Hills. Multiple-hole dens had an average of 4.2 entrances. Dens were found at elevations between 206 and 839 m on sites having an average slope angle of 15.1°, and a majority faced the northeast quadrant. No evidence was gathered showing that kit fox den sites were selected because of the presence of particular plant species or associations.

As in 1980 relative densities of black-tailed jackrabbits (43.8) and desert cottontails (19.3) were highest on the Coalinga Land Unit. Lagomorph densities on the other land units ranged between 2.4 and 3.7.

ACKNOWLEDGEMENTS

We wish to acknowledge the contributions of Brenda Evans, Brad Hardenbrook, Rachel Horwitz, and Jeff Johnson who shared the rigorous field work and helped gather the data used in this report.

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1. INTRODUCTION

1.1 BACKGROUND

On 28 December 1973, the Endangered Species Act (ESA) (Public Law 93-205) became law and superseded similar acts passed in 1966 and 1969. In Section 2(c) and Section 7(a) it was declared that all Federal departments and agencies shall seek to conserve endangered species and threatened species listed pursuant to Section 4 of the ESA. Section 7(a) further states that each federal agency shall insure that any action authorized, funded, or carried out by such agency does not jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary of the Interior to be critical.

The San Joaquin kit fox, *Vulpes macrotis mutica*, and the blunt-nosed leopard lizard, *Crotaphytus* (=*Gambelia*) *silus*, were once widely distributed in the semi-arid Central Valley of California (Grinnell, et al, 1937; Stebbins, 1954). Both are now considered to be endangered and are on the Secretary of the Interior's List of Endangered and Threatened Species (*Federal Register*, 41:43339-43358 and 41:47180-47198). They have been classified as "rare" and "endangered" respectively by the California Department of Fish and Game, and are included in the IUCN Red Book (1968ab) of rare and endangered species of the world.

The most serious threat to their survival has been loss of habitat following conversion of native vegetation associations to agricultural, industrial, and urban developments (Brode, et al, 1978; Laughrin, 1970; Montanucci, 1965; Morrell, 1972 and 1975; O'Farrell, 1981). Their present range is limited to isolated parcels of remaining valley habitat in the southwestern San Joaquin Valley and the adjoining foothills. The latter habitat is being altered by increased petroleum activities and grazing pressure.

Since the Bureau of Land Management (BLM) is responsible for controlling permits for energy development and grazing on most public lands in the Central Valley, it must ensure that the kit fox and blunt-nosed leopard lizard and their critical habitats are not negatively impacted by these activities. Information on present distribution of kit fox and blunt-nosed leopard lizard on public lands controlled by the BLM, and an appraisal of these parcels' potential value as critical habitat, are required before potential impacts of energy development and grazing can be adequately assessed. On 23 May 1977, President Carter directed the Secretary of the Interior to accelerate identification of critical habitats of endangered species. Support for implementation of this directive as it applies to the kit fox and leopard lizard was made available through funds allocated to the BLM.

1.2 OBJECTIVES

The major objectives of this project were to: 1) determine the presence and relative density of San Joaquin kit fox and blunt-nosed leopard lizards on

approximately 12,000 acres of public land in western Fresno County and eastern San Benito and Monterey counties; 2) describe vegetation types, topography, associated vertebrates, rodent burrow densities, and present land-use patterns for BLM parcels inhabited by the endangered species; and 3) to evaluate the potential of surveyed lands as critical habitat for the kit fox and leopard lizard.

2. METHODS

2.1 GROUND SURVEYS

Ground surveys were conducted to gather data on presence and relative abundance of San Joaquin kit fox and blunt-nosed leopard lizards. Methods for the ground surveys were similar to those used in 1979 (O'Farrell, et al, 1980). Straight line transects were conducted at a density of eight per mile. Lands in the Tumey Hills, surveyed only for leopard lizards, had a transect density equivalent to sixteen line transects per mile. The number and length of transects were adjusted proportionately to parcel size. In some sections, rugged topography forced observers to survey only ridge lines and washes.

Trained personnel slowly walked (<1 mph) the transects using a handheld compass to maintain a straight line. Data gathered during surveys included: 1) date, time, temperature, and weather during transects; 2) presence of kit fox signs (i.e., den sites, scats, tracks, and prey remains); 3) presence of blunt-nosed leopard lizards; 4) topography; 5) evidence of human activity (impact); and 6) tallies (species and number) of all wildlife observed. Records were also kept of the dominant plant species present on all sections of BLM land surveyed, as well as changes in annual and perennial plant associations along transect lines. Data were recorded in field notebooks, and later transcribed into permanent ledger books.

Surveys for blunt-nosed leopard lizards were conducted only when the air temperature was between 20°C and 40°C. Air temperatures were recorded at the beginning, middle, and end of each transect. Air and soil temperatures were recorded at all locations where leopard lizards were sighted. Air temperatures were measured approximately 30 cm and 1 cm above the ground in the observer's shadow. Soil temperatures were measured with the thermometer bulb placed approximately 1 cm below the surface in the observer's shadow. Fast-reading mercury thermometers were used for all temperature measurements.

Locations of all sightings of leopard lizards made during transects were plotted on 7.5-minute topographic maps. Color photographs were taken at the site of each observation.

Each San Joaquin kit fox den site encountered during the transect was examined for the following characteristics: 1) activity (active versus inactive); 2) type (natal, multiple hole, single hole); 3) number and dimensions of entrances; 4) position on slope; 5) aspect; 6) slope angle of the den site; 7) elevation; and 8) presence or absence of fox tracks, scats, prey remains, matted vegetation, dirt berms, other mammals and owls, and human activities and/or disturbances. Detailed descriptions of vegetation in the immediate vicinity of each kit fox den were also noted including 1) species composition and relative density of dominant shrub cover, 2) species composition and relative density of understory grasses and forbs, 3) presence of unusual or uncommon species, 4) general condition of the vegetation, and 5) observations of vegetation disturbance due to either kit fox or human activity.

Dens were positively identified as kit fox dens only when the investigator was satisfied that the size and shape of the den and associated signs (tracks, scats, and prey remains) were consistent with those of a kit fox den. The remainder were recorded as "unidentified," coyote (*Canis latrans*), or badger (*Taxidea taxus*) dens.

Den sites were plotted in the field on 7.5-minute topographical maps, and were later placed on permanent topographical maps included with the master copy of the final report to the BLM. Den sites plotted on topographical maps were given code numbers so their locations could be easily cross-referenced with the field data in ledger books and den analysis information. Color transparencies were taken of den sites.

2.2 NIGHT SPOTLIGHT SURVEYS

Night spotlight surveys were conducted on, or adjacent to, selected BLM land parcels in the Ciervo Hills, Tumey Hills, Griswold Hills, San Ardo, and Coalinga areas to document the presence of kit fox, their potential prey, and other nocturnal vertebrates. Observations were made from a vehicle driven at 10-15 mph with high beams on. One to two passengers used powerful spotlights to locate animals peripheral to the path of the vehicle. When eyeshines were detected, the vehicle was stopped and the identity of the animal determined. The driver recorded all data, including time and mileage of all kit fox observations. Night surveys were preceded by daylight test drives through the area to familiarize the crew with the terrain and route.

2.3 DATA SUMMARIES

Section summary sheets were prepared to provide the BLM with a brief analysis of each parcel surveyed (Appendix A). Information was included on the legal description of the section, date surveyed, field crew, a brief description of the general topography, habitat and disturbances, the number of lagomorphs (*Lepus* and *Sylvilagus*) observed, and any evidence of kit fox and leopard lizards that was observed. Comments were also made on the potential of the section as critical habitat for kit fox and leopard lizards, and on points of significant biological interest.

Information on physical characteristics of each kit fox den was recorded on den analysis sheets, which are summarized in Appendix B.

2.4 LAND UNITS

Four major land units were described by combining adjacent, ecologically similar BLM parcels. The units were based on proximity of parcels, topographical and vegetational similarities, and existing land-use patterns. Combining data from the numerous sections into land units made it easier to formulate kit fox and leopard lizard critical habitat recommendations.

2.5 RATING SYSTEM

A numerical rating system (O'Farrell, et al, 1980) was used (Section 3.5) to make recommendations on the potential of surveyed lands as San Joaquin kit

fox critical habitat. The rating system is based on the Fish and Wildlife Service guidelines for the delineation of "... vital needs ... relevant in determining 'critical habitat' for a given species ...," including:

1. Space for normal growth, movements, or territorial behavior
2. Nutritional requirements, such as food, water, and minerals
3. Sites for breeding, reproduction, or rearing offspring
4. Cover or shelter
5. Other biological, physical, or behavioral requirements (*Federal Register*, *40*, 78 [22 April 1975])

Interpretations of these guidelines were adapted to reflect significant aspects of the ecology of the San Joaquin kit fox that could be observed and qualified, if not quantified, during field surveys. Five rating categories paralleling the FWS guidelines were proposed: Presence of Species, Breeding Sites, Prey Base, Space, and Other Habitat Parameters. Numerical values were established reflecting conditions between the most (3) and least (0) optimal states in each category. Land units were then assigned values, determined by field data and observations, for each category.

Presence of Species was considered essential in determining the potential of a land unit as kit fox critical habitat. The most unequivocal evidence of kit fox observable during daytime transect-type surveys was the presence of dens. For comparative purposes a relative density index (number of dens per 1000 acres) was calculated for each land unit.

The second category, Breeding Sites, provided an important assessment of the reproductive success of kit fox on each land unit. Relative density (number/1000 acres) of natal dens was the criterion used to assign numerical values within this category.

Presence of an adequate Prey Base was the third factor used to rank the potential of land units as critical habitat. Assuming that San Joaquin kit fox prey heavily on lagomorphs (Egoscue, 1962; Knapp, 1978; O'Farrell and Gilbertson, 1979), especially during the breeding season, we determined the relative densities (number/1000 acres) of jackrabbits and cottontails in each land unit. Density indices were used to assign numerical values within this category.

Space to support and protect a breeding population is essential to an endangered species. Large contiguous parcels of relatively undisturbed land under federal jurisdiction were considered to be optimal. Relatively small, widely scattered parcels of federal land were judged to be marginally important as potential critical habitat.

A fifth category, Other Habitat Parameters, was created to rank potential importance of three factors thought to influence kit fox populations: impacts of grazing, effects of oil developments, and influence of topography. Quantifiable criteria for ranking the possible significance of these factors were not available; therefore, they were evaluated using subjective judgements of fox specialists who had conducted comparative field studies for two years.

Heavy grazing by cattle and sheep, especially in combination, may have a negative effect on the herbivorous prey of kit fox, although results of studies

testing this hypothesis have not been published. Increasing intensities of petroleum developments also have increasingly negative impacts on populations of San Joaquin kit fox (O'Farrell, et al, 1980). Rugged topography is not suitable habitat for the species (Morrell, 1972; O'Farrell, et al, 1980).

Numerical values were assigned for each land unit under the three Other Habitat category subheadings. Values were summed and land units were ranked according to their total score under this category, so that land units with the highest and lowest scores received values of 3 and 0, respectively, while land units with intermediate scores received intermediate values.

After ratings were assigned in five categories for each land unit, a cumulative score for each unit was summed. These total scores were used as a comparative index to evaluate land units as potential San Joaquin kit fox critical habitat with respect to each other and, ultimately, with other BLM lands surveyed in 1979 (O'Farrell, et al, 1980).

2.6 VEGETATION SURVEY

Vegetation was sampled on parcels of BLM land selected as representative of the habitat in each land unit. Data were gathered using line intercept and belt transect techniques. Species composition, density, and canopy coverage of shrubs were estimated using four belt transects established at random within surveyed sections. Each belt was 50 m long and 3 m wide. Transect width was defined by a 3-m lath held at midpoint over the transect centerline. Observers worked in pairs to count and record all shrubs, including seedlings, whose canopies were at least 50% inside the belt. Canopy cover for each shrub species was determined by measuring the length of the transect centerline intercepted by shrubs.

Line intercepts, 25-m long, were located along belt transect lines. Data on species composition and frequency of occurence of forbs, grasses, bare ground, and litter were gathered from 100 points along each line. Any species touching the tape at each sample point was recorded. Litter was defined as matted annual vegetation or material from the 1980 growing season. Frequency of occurrence was determined by tallying the number of points each species was touching.

Dominant species of vascular plants observed during vegetation surveys and transects for endangered species were collected. Voucher specimens will be maintained in the EG&G herbarium.

2.7 RODENT BURROW DENSITY

Densities of rodent burrows were estimated using the belt transects established to sample the perennial vegetation. The total number of rodent burrows in two size classes, <4 cm and >4 cm, was tallied in each belt transect. Observers counted only burrows that were at least 10 cm deep to assure that shallow digs were not included in the sample.

3. RESULTS

Field surveys were conducted between 1 June and 15 July 1981. A total of 10,220 acres in the Ciervo Hills and Coalinga area were surveyed for both San Joaquin kit fox and blunt-nosed leopard lizards, 810 acres in the Griswold Hills were surveyed for kit fox only, and 2,000 acres in the Tumey Hills were surveyed for blunt-nosed leopard lizards only (Figure 1). Seven parcels totalling 1,840 acres were not surveyed because access was difficult, the land was presently under cultivation, or the parcel had low potential as endangered species critical habitat. The 2,440 acres of BLM land, Sections 31 and 32, T22S, R10E, and Sections 4, 5, 8, 9, 17, 19, 20, 30, and 32, T22S, R11E, near San Ardo in the Salinas Valley were not surveyed. Preliminary ground investigations and a night spotlight survey indicated that they had little potential as habitat for kit fox, primarily because they were so rugged.

Surveys conducted for presence and relative abundance of blunt-nosed leopard lizards were completed by 19 June 1981; 4,080 acres were surveyed by standard techniques, and 7,880 acres were surveyed by ridge-wash techniques. An additional 340 acres of rolling hills in the Tumey Hills were surveyed intensively with transects spaced at 100-m intervals. All surveys were conducted within the optimal temperature range for lizard activity.

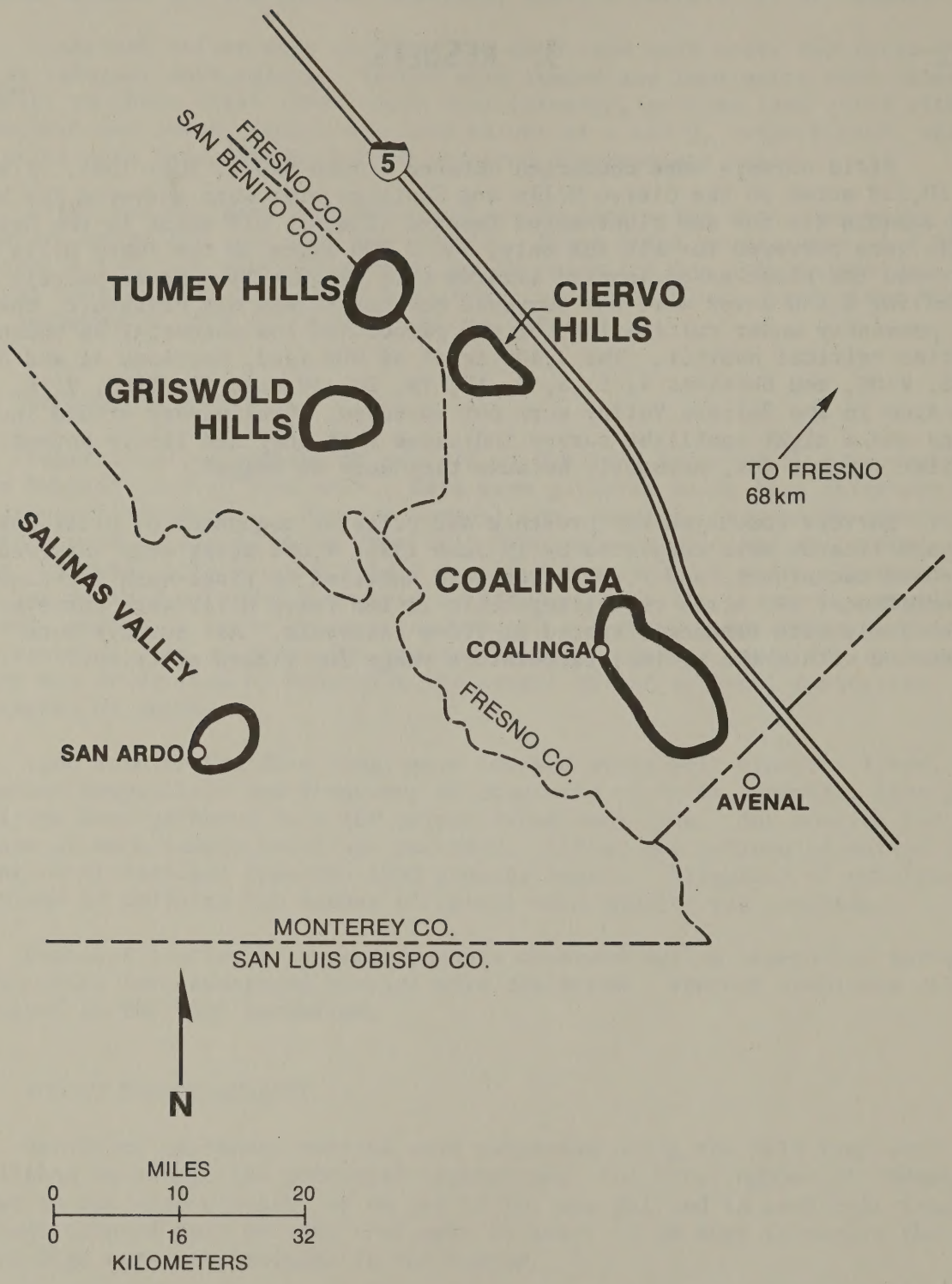

Figure 1. Location of BLM lands in the Coalinga, Ciervo Hills, Griswold Hills, and Tumey Hills Land Units, and Salinas Valley that were assigned for survey in 1981 to determine their potential as critical habitat for endangered species.

3.1 CIERVO HILLS LAND UNIT

3.1.1 Description

The Ciervo Hills Land Unit, totalling 7,020 acres, was composed of a checkerboard of 16 federal land parcels, interspersed with private land holdings, in the central Ciervo Hills-Monocline Ridge region, Fresno County (Table 1, Figure 2). It was bounded on the north and east by the San Joaquin Valley, on the west by the Fresno/San Benito county line, and on the south by Cantua Creek.

Numerous steep drainages dissected the land unit into a series of ridges, washes, and high plateaus. Elevation ranged between 960 m and 2960 m.

Intensive grazing by sheep was the predominant disturbance observed. A series of well-maintained dirt roads were dispersed throughout the land unit, but access was restricted by a series of locked gates.

3.1.2 Vegetation

The dominant plant association observed in the Ciervo Hills was Upper Sonoran Grassland (Twisselman, 1967). Grasses observed in the heavily grazed (>60% of annual biomass removed) parcels included *Bromus rubens*, *Bromus mollis*, *Festuca megalura*, and *Hordeum* sp. *Bromus mollis* was more frequently tallied (17%) in this land unit than in any other (Table 2). Common forbs throughout the land unit included *Lepidium* sp., *Eremocarpus setigerus*, *Erodium cicutarium*, *Eriogonum gracillimum*, and *Eriogonum inflatum* (Tables 2 and 3).

Shrub cover was limited primarily to drainage bottoms, infrequent patches of exposed hillsides, and peaks of ridges and hills. *Gutierrezia bracteata*,

Table 1. BLM lands in the Ciervo Hills Land Unit surveyed to determine their potential as critical habitat for San Joaquin kit fox and blunt-nosed leopard lizards.

Survey Method/ Quadrangle	Township/Range*	Section	Area (acres)
Ridge/Wash			
Monocline Ridge	T16S, R13E	22,26,28,30	6,220
Ciervo Mountain	T16S, R13E	32,34	
	T17S, R13E	10,12,14,22,24	
Lillis Ranch	T17S, R14E	18	
Deleted			
Ciervo Mountain	T17S, R13E	26	800
Lillis Ranch	T17S, R14E	6,8	

*Mt. Diablo Meridian

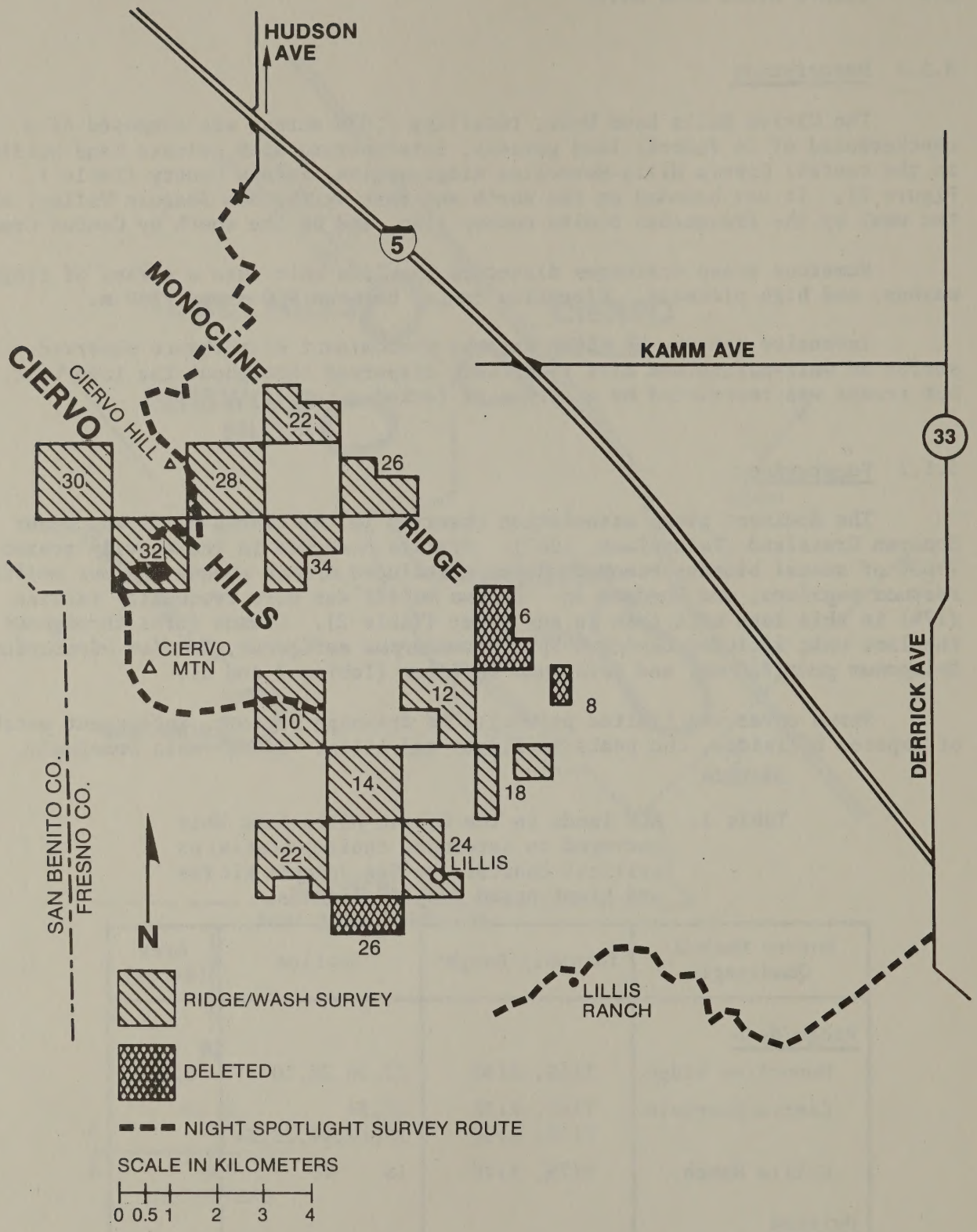

Figure 2. Parcels of BLM land in the Ciervo Hills Land Unit surveyed in 1981 to determine their potential as critical habitat for San Joaquin kit fox and blunt-nosed leopard lizards. Section centers are numbered.

Table 2. Characteristics of vegetation, litter, and open space measured in the Ciervo Hills Land Unit in 1981. Density, frequency, and canopy coverage are presented for shrubs; frequency of occurrence is tabulated for grasses, forbs, open space, and litter.

Species	Section					
	10	14	22	32	34	Σ
SHRUBS						
Atriplex polycarpa						
Density (N/ha)		150 ±150			50 ±50	40 <31
Frequency (%)		25			25	10
Canopy Coverage (%)		0			0.025	<0.1
Atriplex spinifera						
Density (N/ha)		84 ±63				17 ±14
Frequency (%)		50				10
Canopy Coverage (%)		0.2 ±0.2				<0.1
Gutierrezia sp.						
Density (N/ha)			283 ±241			57 ±50
Frequency (%)			50			10
Canopy Coverage (%)			0.25 ±0.25			<0.1
Haplopappus linearifolius						
Density (N/ha)	3083 ±2698	17 ±17	33 ±33		300 ±182	687 ±554
Frequency (%)	50	25	25		50	40
Canopy Coverage (%)	0	0	0		0.25 ±0.25	<0.1
Ephedra californica						
Density (N/ha)		67 ±67				13 ±13
Frequency (%)		25				5
Canopy Coverage (%)		0.9 ±0.9				<0.1
GRASSES AND FORBS						
Bromus rubens	2.0 ±0.4	5.5 ±2.2	15.3 ±6.0	1.5 ±0.5	5.2 ±1.8	5.9 ±1.6
Bromus mollis	24.5 ±14.3	14.8 ±3.2		18.0 ±6.3	28.2 ±6.0	17.1 ±3.8
Bromus tectorum			0.2 ±0.2			<0.1
Distichlis spicata		0.2 ±0.2				<0.1
Festuca megalura	26.0 ±11.7	0.8 ±0.8		52.3 ±9.5	35.8 ±4.8	23.0 ±5.5
Festuca reflexa				0.2 ±0.2		<0.1
Festuca sp.	0.2 ±0.2					<0.1
Hordeum sp.	0.2 ±0.2	7.5 ±5.0		1.0 ±0.4	1.0 ±0.7	2.0 ±1.1
Schismus arabicus			5.8 ±2.7			1.2 ±0.7
Oryzopsis hymenoides			0.2 ±0.2			<0.1
Erodium cicutarium	0.75 ±0.5	2.8 ±0.8	9.5 ±2.7			2.6 ±1.0
Erodium sp.				6.2 ±2.8	9.5 ±1.8	3.2 ±1.0
Eremocarpus setigerus	0.5 ±0.5				0.2 ±0.2	0.2 ±0.1
Lepididium nitidum		4.0 ±4.0				0.8 ±0.8
Lepididium sp.	2.0 ±1.2	0.8 ±0.8		2.0 ±0.4	0.5 ±0.5	1.1 ±0.3
Plagiobothrys sp.	0.5 ±0.5					0.1 ±0.1
Eriastrum sp.	0.2 ±0.2				0.2 ±0.2	<0.1
Eriastrum pluriflorum			0.8 ±0.8			0.2 ±0.2
Centaurea sp.		0.2 ±0.2				<0.1
Unknown Shrubs			5.0 ±1.0			1.0 ±0.5
Open Space	23.0 ±12.5	46.8 ±5.2	62.0 ±16.0	6.8 ±1.0	4.8 ±1.3	28.7 ±6.0
Litter	20.0 ±4.7	16.8 ±5.3	1.0 ±0.7	11.0 ±1.8	14.5 ±4.0	12.7 ±2.1

Table 3. Dominant species observed along ground transects in the Ciervo Hills Land Unit in 1981

Species	T16S, R13E						T17S, R13E					T17S, R14E
	Section						Section					Section
	22	26	28	30	32	34	10	12	14	22	24	18
GRASSES												
Poaceae												
Avena sp.		✓	✓							✓	✓	
Bromus diandrus	✓	✓	✓				✓					
Poa scabrella							✓					
Stipa lepida	✓											
Stipa sp.	✓						✓					
FORBS												
Asteraceae												
Ambrosia acanthicarpa								✓				
Ambrosia sp.					✓							
Chrysothamnus sp.										✓		
Hemizonia kellogii	✓											
Stephanomeria sp.											✓	
Boraginaceae												
Amsinckia sp.												✓
Brassicaceae												
Brassica sp.					✓		✓					
Sisymbrium orientale							✓					
Streptanthus sp.			✓									
Chenopodiaceae												
Salsola sp.		✓					✓					
Euphorbiaceae												
Euphorbia ocellata	✓								✓		✓	✓
Euphorbia sp.			✓									
Stillingia linearifolia								✓				
Fabaceae												
Astragalus sp.										✓	✓	
Lupinus bicolor	✓											
Lupinus subvexus								✓				
Lupinus sp.							✓					
Hydrophyllaceae												
Phacelia sp.		✓										
Lamiaceae												
Marrubium vulgare	✓	✓			✓			✓				
Salvia sp.	✓	✓								✓		
Trichostema ovatum						✓						
Trichostema sp.											✓	✓
Nyctaginaceae												
Abronia pogonantha	✓											

Table 3. Dominant species observed along ground transects in the Ciervo Hills Land Unit in 1981 (continued)

Species	T16S, R13E						T17S, R13E					T17S, R14E
	Section						Section					Section
	22	26	28	30	32	34	10	12	14	22	24	18
FORBS (continued)												
Onagraceae												
Camissonia californica	✓											
Camissonia boothii	✓											
Camissonia sp.	✓											
Oenothera hookeri	✓											
Papaveraceae												
Eschscholtzia minutiflora							✓					
Plantaginaceae												
Plantago sp.				✓								
Polemoniaceae												
Langloisia schottii	✓											
Polygonaceae												
Chorizanthe perfoliata	✓											
Eriogonum gracile						✓						
Eriogonum gracillimum	✓	✓	✓	✓	✓	✓	✓			✓	✓	
Eriogonum inflatum	✓		✓	✓		✓	✓			✓	✓	✓
Eriogonum viridescens	✓											
Hollisteria lanata	✓									✓		
Rumex hymenosepalus	✓											
Solanaceae												
Datura sp.										✓		
Nicotiana bigelovii					✓							
Typhaceae												
Typha domingensis							✓					
Typha sp.							✓					
SHRUBS												
Asteraceae												
Acamptapappus schaerocephalus							✓					
Artemesia californica								✓				
Eriophyllum confertiflorum							✓					
Gutierrezia bracteata	✓	✓										✓
Haplopappus sp.	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Chenopodiaceae												
Atriplex lentiformis										✓		✓
Polygonaceae												
Eriogonum fasciculatum			✓					✓		✓	✓	
Solanaceae												
Nicotiana glauca									✓			

Haplopappus linearifolius, *Atriplex polycarpa*, and *Ephedra californica* were the most commonly observed shrub species. The greatest densities of *Haplopappus linearifolius* were measured in this land unit. Most slopes and rolling plateau areas were devoid of shrub cover. The area was burned in June, 1979.

More open space (28%) and less litter (13%) were characteristic of ground cover in the Ciervo Hills.

3.1.3 Surveys

A total of 6,220 acres of BLM land in the Ciervo Hills Land Unit was surveyed using ridge/wash techniques (Table 1). Two parcels totalling 480 acres were deleted from the survey because of access difficulties. A 320-acre parcel was deleted because the topography was considered too rugged for frequent use by kit fox and blunt-nosed leopard lizards.

Fourteen dens were found on BLM land in the Ciervo Hills including: one active natal den, seven active multiple-hole dens, three inactive multiple-hole dens, two active single-hole dens, and one inactive single-hole den. Eight kit fox dens were noted on private land adjacent to BLM parcels; these included: one active natal den, four active multiple-hole dens, and three inactive multiple-hole dens.

Two night spotlight surveys totalling 23.1 miles were conducted within and adjacent to the Ciervo Hills (Figure 2). Nine kit fox, 13 black-tailed jackrabbit (*Lepus californicus*), 64 desert cottontails (*Sylvilagus audubonii*), two bobcats (*Lynx rufus*), one coyote, and eight other species of vertebrates were observed (Appendix C).

Lagomorph observations during ground surveys were limited to nine black-tailed jackrabbits and six desert cottontails.

No blunt-nosed leopard lizards were sighted; however, six desert spiny lizards (*Sceloporus magister*), 76 side-blotched lizards (*Uta stansburiana*), six coast horned lizards (*Phrynosoma coronatum*), and three western whiptails (*Cnemidophorus tigris*) were observed (Appendix D).

3.1.4 Rodent Burrows

The average number of rodent burrows measured in the Ciervo Hills was 287 ±74 per hectare; the range was between 84 and 501 per hectare. Variability was great and there were no significant differences between average densities of size classes. Therefore, data were lumped in this and subsequent analyses of burrow densities.

3.2 COALINGA LAND UNIT

3.2.1 Description

The Coalinga Land Unit consisted of 4,920 acres of BLM land in 12 parcels (Table 4, Figure 3). Topography varied from gently rolling hills in the East Coalinga Extension Oil Field to steep hills dissected by numerous drainages in the North Dome-Kettleman Hills region. Elevation ranged between 530 m and 1,125 m.

Oil developments and related activities were the primary form of disturbance. Heavy grazing by sheep was observed in the Kettleman Hills. Three parcels (Sections 4 and 10, T20S, R15E; and Section 8, T20S, R16E) were not surveyed because they were being cultivated.

3.2.2 Vegetation

Dense, ungrazed stands of *Bromus diandrus*, *Bromus rubens*, and *Festuca megalura* dominated BLM parcels in the East Coalinga Extension Oil Field (Tables 5 and 6). *Bromus rubens* achieved its highest frequency of occurrence (31%) here. Vegetation in the Pleasant Valley Oil Field and Guijarral Hills consisted of heavily grazed *Bromus rubens*, *Festuca megalura*, and *Erodium cicutarium*, intermixed with young *Salsola kali* and *Astragalus*. A heavily grazed Upper Sonoran Grassland association (Twisselman, 1967), consisting primarily of *Bromus rubens* and *Festuca megalura*, was noted throughout the North Dome-Kettleman Hills region. A dense shrub cover of *Atriplex polycarpa* and *Gutierrezia bracteata* occurred in most drainage bottoms and in localized patches on ridges and hillsides.

Table 4. BLM lands in the Coalinga Land Unit surveyed in 1981 to determine their potential as critical habitat for San Joaquin kit fox and blunt-nosed leopard lizards.

Survey Method/ Quadrangle	Township/Range*	Section	Area (acres)
Standard Ground			
Coalinga	T20S, R15E T20S, R16E	10 6,18,20,8	4,000
Guijarral Hills	T20S, R16E	34	
Avenal	T21S, R17E	18,20,30	
Deleted			
Coalinga	T20S, R15E T20S, R16E	4,10 8	920
Avenal	T21S, R17E	18	

*Mt. Diablo Meridian

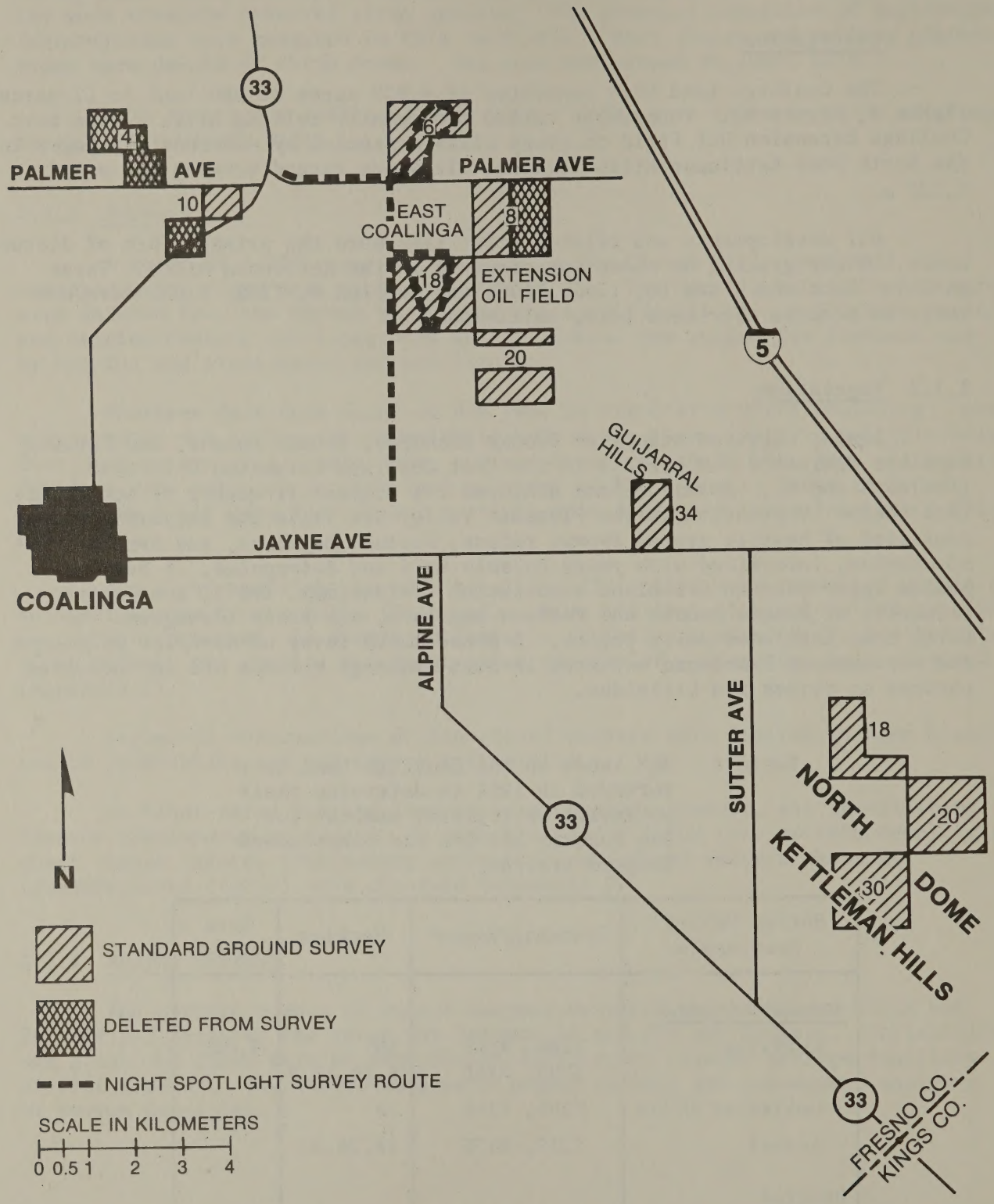

Figure 3. Parcels of BLM land in the Coalinga Land Unit surveyed in 1981 to determine their potential as critical habitat for San Joaquin kit fox and blunt-nosed leopard lizards. Section centers are numbered.

Table 5. Characteristics of vegetation, litter, and open space measured in the Coalinga Land Unit in 1981. Density, frequency, and canopy coverage are presented for shrubs; frequency of occurrence is tabulated for grasses, forbs, open space, and litter.

Species	Section				
	6	18	20	30	Σ
SHRUBS					
Atriplex polycarpa					
Density (N/ha)			50 ±50	167 ±111	54 ±32
Frequency (%)			25	50	19
Canopy Cover (%)			0.8		0.2 ±0.2
Gutierrezia sp.					
Density (N/ha)	660 ±600	933 ±826	500 ±500	517 ±407	637 ±274
Frequency (%)	25	50	25	100	50
Canopy Cover (%)		1.2 ±1	1 ±1		0.6 ±0.4
Gutierrezia bracteata					
Density (N/ha)	3217 ±3217				804 ±804
Frequency (%)	25				6
Canopy Cover (%)					
GRASSES AND FORBS					
Avena barbata		4.2 ±2.7			0.8 ±0.6
Bromus rubens	23.0 ±4.4	46.5 ±6.1	34.2 ±18.9	20.8 ±3.5	31.1 ±5.3
Bromus diandrus		3.0 ±1.2	0.2 ±0.2		0.6 ±0.4
Festuca megalura	37.0 ±5.1	10.8 ±5.0	18.8 ±5.7	18.5 ±1.0	21.2 ±3.2
Hordeum sp.		1.5 ±1.0		0.2 ±0.2	0.4 ±0.3
Schismus arabicus	0.2 ±0.2		1.5 ±0.9		0.4 ±0.3
Schismus sp.				2.8 ±2.4	0.6 ±0.5
Erodium cicutarium	1.5 ±1.0		1.8 ±1.2		0.8 ±0.4
Erodium sp.		2.5 ±1.7		5.8 ±1.1	1.9 ±0.8
Eremocarpus setigerus	0.5 ±0.3	0.2 ±0.2	1.2 ±0.5	0.5 ±0.5	0.6 ±0.2
Euphorbia sp.				0.2 ±0.2	<0.1
Salsola kali	0.2 ±0.2	9.8 ±3.6			2.5 ±1.4
Hemizonia sp.				0.2 ±0.2	<0.1
Trichostema sp.	0.2 ±0.2				<0.1
Plagiobothrys sp.	0.2 ±0.2		0.2 ±0.2		<0.1
Astragalus sp.				1.5 ±1.5	0.3 ±0.3
Unknown Forb		0.2 ±0.2			<0.1
Open Space	4.8 ±2.9	1.0 ±1.0	24.8 ±16.3	22.2 ±3.2	13.2 ±4.6
Litter	32.2 ±5.0	19.0 ±2.7	17.2 ±8.1	27.2 ±2.6	24.0 ±2.8

Table 6. Dominant plant species observed along ground transects in the Coalinga Land Unit in 1981

Species	T20S, R16E					T21S, R17E		
	Section					Section		
	6	8	18	20	34	18	20	30
GRASSES								
Poaceae								
Avena sp.	✓		✓	✓				
Bromus tectorum	✓	✓	✓					
Festuca reflexa	✓							
Oryzopsis hymenoides			✓					
FORBS								
Asteraceae								
Ambrosia dumosa			✓					
Ambrosia sp.	✓		✓					
Stephanomeria pauciflora			✓					
Stephanomeria sp.			✓					
Boraginaceae								
Amsinkia sp.			✓					
Chenopodiaceae								
Salsola sp.			✓	✓	✓	✓		
Cucurbitaceae								
Cucurbita palmata								✓
Euphorbiaceae								
Euphorbia ocellata							✓	✓
Fabaceae								
Astragalus douglasii							✓	
Lamiaceae								
Marrubium vulgare							✓	
Polygonaceae								
Eriogonum sp.		✓						
Solanaceae								
Datura sp.					✓			
Typhaceae								
Typha sp.								✓
SHRUBS/SUB-TREES								
Chenopodiaceae								
Atriplex lentiformis	✓							
Solanaceae								
Nicotiana glauca							✓	
Nicotiana sp.							✓	
Tamaricaceae								
Tamarix sp.	✓						✓	✓

There was less open space (13%) in the ground cover of the Coalinga Land Unit compared with other BLM parcels measured in 1981 (Table 5).

3.2.3 Surveys

A total of 4,000 acres of BLM land was surveyed and 920 acres was deleted (Table 4). Evidence of kit fox was noted in five of the nine BLM sections surveyed. Fifteen kit fox dens were observed, including three active single-hole dens, eight inactive multiple-hole dens, one active single-hole den, one inactive single-hole den, and two dens were found in man-made structures. One kit fox was sighted during ground surveys in Section 20, T21S, R17E.

A night spotlight survey was conducted through the East Coalinga Oil Field. Species observed included 51 black-tailed jackrabbits, 24 desert cottontails, and five coyotes.

A total of 175 black-tailed jackrabbits and 77 desert cottontails were noted during transect surveys.

One blunt-nosed leopard lizard was observed in Section 18, T21S, R17E. Air temperature at the time of the sighting (1345) was 34.0°C. This was within the range of temperatures that included all sightings of blunt-nosed leopard lizards reported in Kern County in 1980 (O'Farrell and Kato, 1980). The soil temperature was greater than 50°C. The lizard was basking in partial shade under an *Atriplex polycarpa* on an old concrete well pad foundation.

3.2.4 Rodent Burrows

Average density of rodent burrows was 375 ±144 per hectare. No burrows were observed in Section 18, T20S, R16E. The greatest density was 1,184 per hectare in Section 30, T21S, R17E.

3.3 GRISWOLD HILLS LAND UNIT

3.3.1 Description

The Griswold Hills Land Unit, totalling 930 acres, consisted of one main parcel of 680 acres, and five small scattered parcels averaging 50 acres (Table 7, Figure 4). It was located at the eastern end of Vallecitos Valley near the junction of New Idria Road and Silver Creek drainage. Steep south-facing slopes, and ridges ending in rolling hills were the predominant topographic features. Elevation ranged between between 488 m and 720 m.

Moderate (30%-60% of annual biomass removed) to heavy grazing by cattle was the only major disturbance observed.

3.3.2 Vegetation

Parcels of BLM land along the foothills of the Griswold Hills contained a composite of Upper Sonoran Grassland and Upper Sonoran Subshrub assocations (Twisselman, 1967). Parcels having low relief were dominated by a heavily grazed *Bromus mollis*, *Bromus rubens*, *Festuca megalura*, and *Hordeum* sp., grassland. Vegetation associations in areas of high relief at greater elevations contained the above grasses plus a mixture of at least 13 species of woody plants including *Eriogonum fasciculatum*, *Gutierrezia bracteata*, *Yucca whipplei*, *Ephedra californica*, *Eriogonum fasciculatum*, and *Juniperus californica* (Table 8 and 9). This was the only land unit that did not have *Atriplex polycarpa* in the shrub cover. *Festuca megalura* had its highest frequency of occurrence here.

Table 7. BLM land in the Griswold Hills Land Unit surveyed in 1981 to determine their potential as critical habitat for San Joaquin kit fox.

Survey Method/ Quadrangle	Township/Range*	Section	Area (acres)
Standard Ground			
Idria	T17S, R11E T17S, R12E	1 5,7	290
Ridge/Wash			
Idria	T17S, R12E	6	520
Deleted			
Idria	T17S, R11E T17S, R12E	2 18	120

*Mt. Diablo Meridian

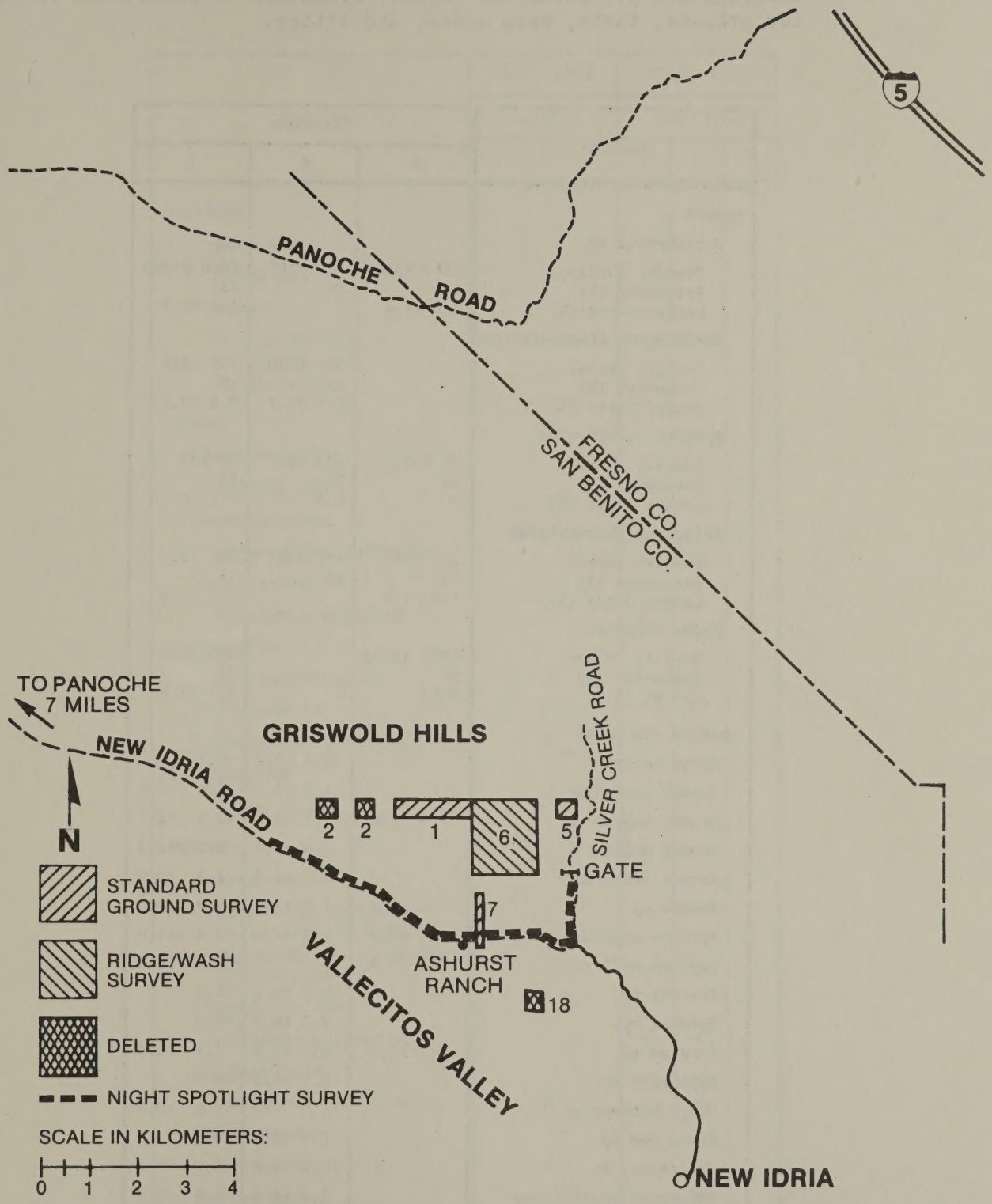

Figure 4. Parcels of BLM land in the Griswold Hills Land Unit surveyed in 1981 to determine their potential as critical habitat for San Joaquin kit fox. Section centers are numbered.

Table 8. Characteristics of vegetation, litter, and open space measured in the Griswold Hills Land Unit in 1981. Density, frequency, and canopy coverage are presented for shrubs; frequency of occurrence is tabulated for grasses, forbs, open space, and litter.

Species	Section		
	1	6	Σ
SHRUBS			
Gutierrezia sp.			
Density (N/ha)	3383 ±2486	217 ±217	1800 ±1300
Frequency (%)	50	25	38
Canopy Cover (%)	2.4 ±1.4		1.2 ±0.8
Haplopappus linearifolius			
Density (N/ha)		317 ±220	158 ±118
Frequency (%)		50	25
Canopy Cover (%)		0.7 ±0.4	0.3 ±0.2
Ephedra californica			
Density (N/ha)	17 ±17	134 ±61	75 ±37
Frequency (%)	25	75	62
Canopy Cover (%)	0	0.4	0.2 ±0.2
Eriogonum fasciculatum			
Density (N/ha)	517 ±517	467 ±281	492 ±273
Frequency (%)	25	50	38
Canopy Cover (%)	1.2 ±1.2		0.6 ±0.6
Yucca whipplei			
Density (N/ha)	1867 ±1195		933 ±656
Frequency (%)	50		25
Canopy (%)	5 ±3		2.4 ±1.6
GRASSES AND FORBS			
Avena barbata		0.2 ±0.2	<0.1
Bromus carinatus		4.0 ±3.7	2.0 ±1.9
Bromus rubens	7.5 ±1.0	17.5 ±4.2	12.5 ±2.7
Bromus mollis		9.0 ±6.4	4.5 ±3.4
Bromus diandrus		2.5 ±1.7	1.2 ±0.9
Bromus sp.	0.5 ±0.5	1.5 ±1.5	1.0 ±0.8
Festuca megalura	61.2 ±3.4	5.5 ±4.2	33.4 ±11.0
Festuca reflexa	2.5 ±1.3		1.2 ±0.8
Festuca sp.		0.2 ±0.2	<0.1
Hordeum sp.		0.2 ±0.2	<0.1
Erodium sp.	3.5 ±1.8	8.2 ±5.0	5.9 ±2.6
Euphorbia sp.		0.2 ±0.2	<0.1
Plagiobothrys sp.			0.8 ±0.8
Eriastrum sp.		0.2 ±0.2	<0.1
Camissonia sp.		0.5 ±0.5	0.2 ±0.2
Eriogonum gracillimum		3.2 ±0.5	1.6 ±0.7
Eriogonum sp.		1.5 ±1.0	0.8 ±0.5
Unknown Forb		0.2 ±0.2	<0.1
Open Space	6.0 ±2.3	28.2 ±6.1	17.1 ±5.2
Litter	18.5 ±2.5	16.8 ±3.1	17.6 ±1.9

Table 9. Dominant plant species observed along ground transects in the Griswold Hills Land Unit in 1981.

Species	T17S, R11E	T17S, R12E		
	Section	Section		
	1	5	6	7
GRASSES				
Cyperaceae				
Carex sp.			✓	
Poaceae				
Poa scabrella			✓	
Polypogon sp.			✓	
Schismus sp.			✓	
FORBS				
Chenopodiaceae				
Salsola sp.			✓	
Euphorbiaceae				
Eremocarpus setigerus			✓	
Geraniaceae				
Erodium cicutarium		✓		
Lamiaceae				
Salvia carduacea	✓			
Polygonaceae				
Eriogonum inflatum	✓			
Typhaceae				
Typha sp.			✓	
SHRUBS				
Asteraceae				
Eastwoodia elegans			✓	
Gutierrezia bracteata			✓	
Haplopappus acradenius			✓	
Haplopappus sp.		✓	✓	✓
Chenopodiaceae				
Atriplex polycarpa		✓	✓	
Cupressaceae				
Juniperus californica	✓		✓	
Polygonaceae				
Eriogonum sp.	✓			
Salicaceae				
Populus fremontii			✓	
Salix sp.			✓	
Tamaricaceae				
Tamarix sp.			✓	

3.3.3 Surveys

A total of 810 acres of BLM land was surveyed: 290 acres by standard ground techniques and 520 acres by modified ridge/wash techniques (Table 7). Three parcels, totalling 120 acres, were not surveyed because of their small size (40 acres) and inaccessibility. No evidence of kit fox was observed during ground surveys. No kit fox were sighted during a night spotlight survey along New Idria Road (Appendix C).

Only two black-tailed jackrabbits and one desert cottontail were observed.

3.4 TUMEY HILLS LAND UNIT

3.4.1 Description

The Tumey Hills Land Unit was composed of three parcels, totalling 2,000 acres (Table 10, Figure 5). The largest parcel, 1,460 acres, contained steep west-facing drainages emptying into Silver Creek and Panoche Creek. A 200-acre parcel was located in rolling hills and ridges on the western boundary of Silver Creek drainage. The last parcel contained 340 acres of low-relief public land within the central plateau of the Tumey Hills. Elevation ranged between 183 m and 410 m.

Cattle grazing was the primary disturbance observed.

3.4.2 Vegetation

Vegetation was dominated by an Upper Sonoran Grassland association (Twisselman, 1967). Steep slopes had a ground cover of *Bromus mollis*, *Bromus rubens*, *Hordeum* sp., and *Festuca megalura*, and a shrub cover of *Eastwoodia elegans*, *Atriplex polycarpa*, *Gutierrezia bracteata*, and *Haplopappus* sp. (Tables 11 and 12). Vegetation in the rolling central plateau was primarily heavily grazed *Bromus rubens*, *Erodium* sp., and *Festuca megalura*, with a scattered shrub cover of *Atriplex polycarpa*. Frequency of occurrence of litter was greatest (24%) in this land unit.

3.4.3 Ground Surveys

Ridge/wash surveys were conducted on 1,600 acres of rugged terrain bordering Silver Creek and Panoche Creek (Table 10). Intensive ground surveys (16 transects per mile) were conducted on 340 acres in the central plateau region (Table 10).

Table 10. BLM lands in the Tumey Hills Land Unit surveyed in 1981 to determine their potential as critical habitat for blunt-nosed leopard lizards.

Survey Method/ Quadrangle	Township/Range*	Section	Area (acres)
Intensive Ground			
Tumey Hills	T15S, R12E	28,33	340
Ridge/Wash			
Tumey Hills	T15S, R12E	15,21,22,28, 29,32,33	1,660

*Mt. Diablo Meridian

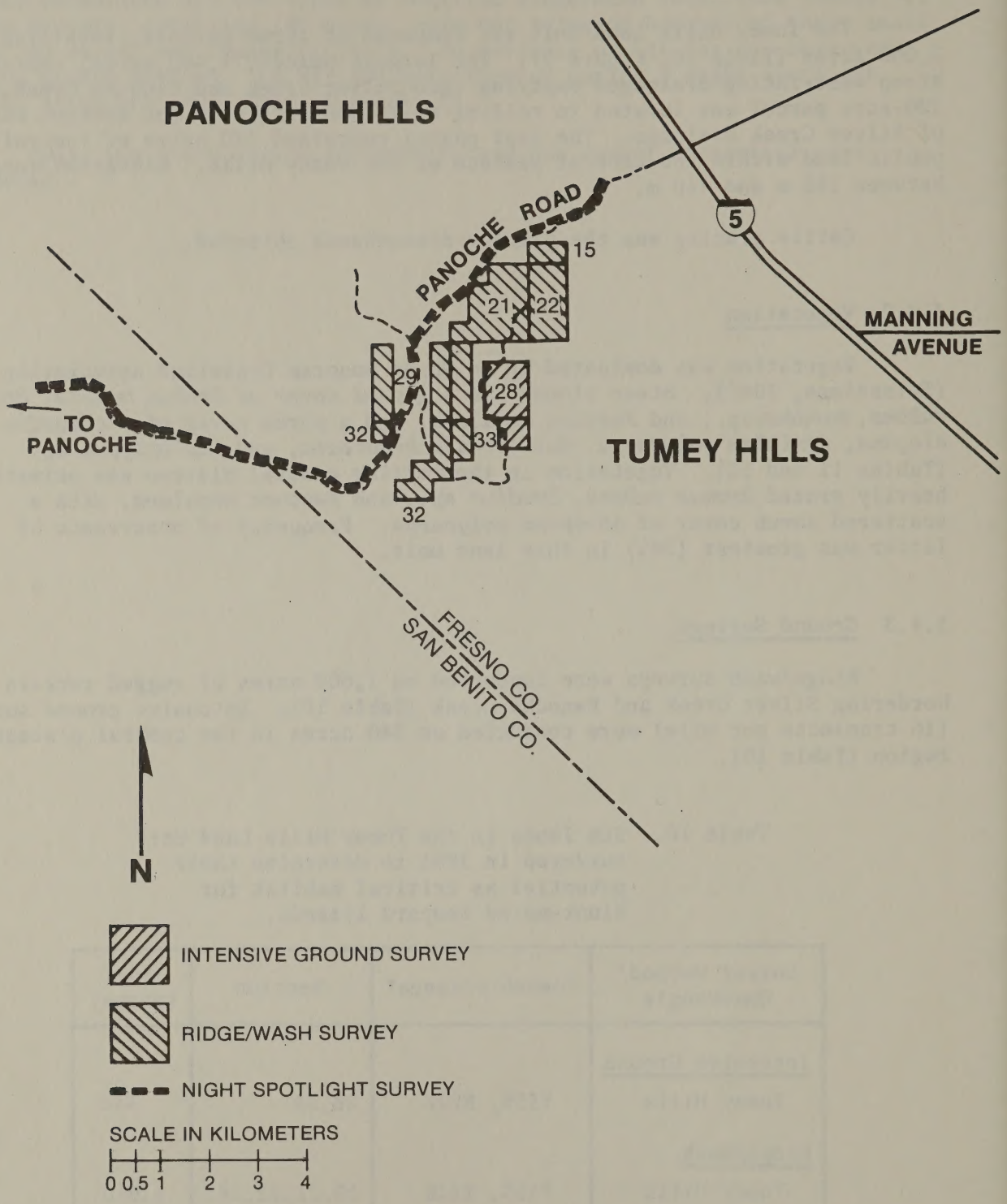

Figure 5. Parcels of BLM land in the Tumey Hills Land Unit surveyed in 1981 to determine their potential as blunt-nosed leopard lizard critical habitat. Section centers are numbered.

Table 11. Characteristics of vegetation, litter, and open space measured in the Tumey Hills Land Unit in 1981. Density, frequency, and canopy coverage are presented for shrubs; frequency of occurrence is tabulated for grasses, forbs, open space, and litter.

Species	Section			
	21	28	32	Σ
SHRUBS				
Atriplex polycarpa				
Density (N/ha)	100 ±64		417 ±264	172 ±98
Frequency (%)	50		100	50
Canopy Cover (%)	0.4 ±0.2		0.2 ±0.2	0.2 ±0.1
Atriplex spinifera				
Density (N/ha)	33 ±33		483 ±129	172 ±78
Frequency (%)	25		100	42
Canopy Cover (%)			2.4 ±1.6	0.8 ±0.6
Gutierrezia sp.				
Density (N/ha)	1417 ±1266			472 ±431
Frequency (%)	50			17
Canopy Cover (%)	0.5 ±0.5			0.2 ±0.2
Haplopappus linearifolius				
Density (N/ha)	716 ±716			239 ±239
Frequency (%)	25			8
Canopy Cover (%)	0.4 ±0.4			0.1 ±0.1
GRASSES AND FORBS				
Bromus rubens	28.0 ±9.5	10.0 ±3.7	6.5 ±4.3	14.8 ±4.4
Bromus mollis		7.5 ±2.5	4.5 ±3.2	4.0 ±1.5
Bromus tectorum	5.0 ±3.0			1.6 ±1.2
Festuca megalura	2.0 ±1.0	42.0 ±3.9	3.0 ±2.1	15.8 ±5.8
Hordeum glaucum			3.5 ±3.5	1.2 ±1.2
Hordeum sp.	4.0 ±1.3	20.0 ±1.8	16.0 ±6.3	13.3 ±2.9
Erodium cicutarium	15.0 ±4.0		2.5 ±0.5	5.8 ±2.3
Erodium sp.		13.5 ±3.4		4.5 ±2.2
Lepidium nitidum			0.2 ±0.2	<0.1
Euphorbia ocellata	0.5 ±0.3			0.2 ±0.1
Euphorbia sp.		0.2 ±0.2		<0.1
Plagiobothrys	0.8 ±0.8		0.5 ±0.3	0.4 ±0.3
Eriogonum gracillimum		0.2 ±0.2		<0.1
Unknown		1.2 ±0.5		0.4 ±0.2
Open Space	8.0 ±3.5	2.3 ±0.8	31.0 ±10.7	13.8 ±5.1
Litter	38.0 ±3.6	3.0 ±0.6	32.3 ±7.5	24.3 ±5.2

Table 12. Dominant plant species observed along ground transects in the Tumey Hills Land Unit in 1981.

Species	T15S, R12E					
	Section					
	21	22	28	29	32	33
GRASSES						
Poaceae						
Avena sp.	✓					
Bromus diandrus	✓					
Distichlis spicata				✓		
Oryzopsis hymenoides	✓					
Schismus arabicus					✓	
Schismus sp.	✓					
Stipa speciosa	✓	✓				
FORBS						
Asteraceae						
Hemizonia kellogii						✓
Stephanomeria pauciflora						✓
Stephanomeria	✓					
Boraginaceae						
Amsinkia sp.	✓					
Brassicaceae						
Lepidium sp.				✓		
Sisymbrium iris					✓	
Sisymbrium sp.				✓		
Chenopodiaceae						
Salsola kali					✓	
Salsola sp.	✓				✓	
Euphorbiaceae						
Eremocarpus setigerus			✓			✓
Papveraceae						
Eschscholzia minutiflora					✓	
Onagraceae						
Camissonia boothii					✓	
Clarkia purpurea	✓					
Polygonaceae						
Eriogonum nudum					✓	
Eriogonum viridescens					✓	
Eriogonum sp.	✓			✓		
SHRUBS						
Asteraceae						
Eastwoodia elegans				✓		
Gutierrezia bracteata			✓			
Haplopappus acradenius					✓	
Haplopappus sp.	✓		✓			✓
Chenopodiaceae						
Atriplex lentiformis	✓				✓	
Polygonaceae						
Eriogonum fasciculatum					✓	
Solanaceae						
Nicotiana glauca					✓	

No blunt-nosed leopard lizards were sighted. Although surveys were conducted within the optimal temperature range for lizard activity, only nine side-blotched lizards were observed.

3.4.4 Rodent Burrows

Average density of rodent burrows was 317 ±110 per hectare. Highest densities, 500 ±240 per hectare, were in Section 21, T15S, R12E. No rodent burrows were observed in Section 32, T15S, R12E.

4. CRITICAL HABITAT RATING SYSTEM AND RANKING

4.1 KIT FOX RATINGS

4.1.1 Presence of Species

A total of 29 kit fox dens was found for an overall relative density of 2.6 per 1,000 acres (Table 13). Fourteen kit fox dens were observed in the Ciervo Hills Land Unit (relative density 2.3/1,000 acres), and 15 were noted in the Coalinga Land Unit (relative density 3.8/1,000 acres). No dens were observed in the Griswold Hills Land Unit.

The Coalinga Land Unit received a score of 3, the Ciervo Hills Land Unit a score of 2, and the Griswold Hills Land Unit a minimum score of 0.

Table 13. Synthesis of type, number (N), and relative densities (RD) of San Joaquin kit fox dens observed in 1981.

Land Unit	Den Type													
	Natal		Multiple-Hole				Single-Hole				Unique*		Totals	
			Active		Inactive		Active		Inactive					
	N	RD†	N	RD	N	RD	N	RD	N	RD	N	RD	N	RD
Ciervo Hills	1	0.2	7	1.1	3	0.5	2	0.3	1	0.2	--	--	14	2.3
Coalinga	--	--	3	0.8	8	2.0	1	0.3	1	0.3	2	0.5	15	3.8
Griswold Hills	--	--	--	--	--	--	--	--	--	--	--	--	0	--
TOTALS	1	0.1	10	0.9	11	1.0	3	0.3	2	0.2	2	0.2	29	2.6

*Dens in man-made structures
†Number per 1,000 acres

4.1.2 Breeding Sites

One active natal kit fox den was observed in the Ciervo Hills Land Unit, for a relative density of 0.2 per 1,000 acres (Table 13). No natal dens were noted in either the Coalinga or Griswold Hills land units.

The Ciervo Hills Land Unit received a score of 1 in this rating category; Coalinga and Griswold Hills received scores of 0.

4.1.3 Prey Base

The highest relative density of lagomorphs (63.0 lagomorphs/1,000 acres), was observed in the Coalinga Land Unit; consequently, it received a score of 3 (Table 14). Low relative densities of lagomorphs were observed in the Ciervo Hills and Griswold Hills land units: 2.4/1,000 acres and 3.7/1,000 acres, respectively. Both land units were assigned scores of 0.

Table 14. Relative densities (numbers observed/1,000 acres) of black-tailed jackrabbits (*Lepus californicus*) and desert cottontails (*Sylvilagus audubonii*) observed in 1981.

Land Unit	*Lepus*	*Sylvilagus*	Total
Ciervo Hills	1.4	1.0	2.4
Coalinga	43.8	19.3	63.0
Griswold Hills	2.5	1.2	3.7
Average Densities	16.9	7.6	24.5

4.1.4 Space

The largest contiguous parcel of BLM land was 680 acres in the Griswold Hills (Table 15). Although Ciervo Hills was the largest land unit in total acreage (7,420 acres), it consisted of a checkerboard of 15 parcels interspersed with private land. Because of the scattered nature and small sizes of BLM parcels, the land units were assigned minimum scores of 0.

Table 15. Total acreage, size of largest contiguous parcel, and number and average size of discontinuous parcels in each land unit surveyed in 1981 to determine their potential as critical habitat for kit fox.

Land Unit	Area (acres)	Largest Contiguous Area (acres)	Discontinuous Parcels	
			Number	Average Area (acres)
Ciervo Hills	7,020	640	15	452
Coalinga	4,920	640	11	389
Griswold Hills	930	680	5	50

4.1.5 Other Habitat Parameters

Grazing — Heavy grazing pressure was observed throughout the Ciervo Hills and Griswold Hills land units, and they were assigned scores of 0 (Table 16). Grazing pressure within the Coalinga Land Unit ranged from light in the East Coalinga Extension Oil Field to heavy in the Pleasant Valley Oil Field. It was given a score of 1.

Table 16. Ratings of BLM land units as potential critical habitat for kit fox based on scores received in the "Other Habitat Parameters" category.

Land Unit	Grazing*	Oil†	Topography+	Cumulative Score	Overall Score#
Ciervo Hills	0	3	2	5	2
Coalinga	1	1	2	4	1
Griswold Hills	0	3	2	5	2

*Grazing: Heavy = 0, Moderate = 1, Light = 2, None = 3
†Development: Extensive = 0, Moderate = 1, Light = 2, None = 3
+Unsuitable Topography = 0, Suitable Topography = 2
#Cumulative Score: 0-2 = 0, 3-4 = 1, 5-6 = 2, 7-8 = 3

Oil Development — Levels of oil field impacts were assessed using published definitions of intensity (O'Farrell, et al, 1980). Since there were no petroleum developments in the Ciervo Hills and Griswold Hills, those land units received scores of 3 (Table 16). Because oil development in the Coalinga Land Unit varied from light in the Pleasant Valley Oil Field to heavy in the North Dome of the Kettleman Hills, this unit was assigned an overall score of 1.

Topography — The three land units appeared to have topography suitable for kit fox habitat, and received scores of 2 (Table 16).

4.1.6 Other Habitat Parameters — Cumulative Scores

Scores assigned under Grazing, Oil Development, and Topography were summed to obtain a cumulative score for each land unit (Table 16). Overall scores under the Other Habitat Parameters category were assigned to each land unit according to the relative scale proposed in 1979 (O'Farrell, et al, 1980). The Ciervo Hills and Griswold Hills Land Units received cumulative scores of 5, and were assigned overall scores of 2. The cumulative score for the Coalinga Land Unit was 4; the overall score was 1.

4.1.7 Final Score

Scores received by each land unit for the five rating system categories were summed, and the land units were ranked according to these totals. Coalinga

had the highest total score, and was ranked first of the land units surveyed in 1981 (Table 17). Ciervo Hills and Griswold Hills had total scores of 5 and 1, respectively, and were ranked second and third.

Table 17. Ratings of BLM land units surveyed in 1981 to determine their potential as critical habitat for San Joaquin kit fox.

Land Unit	Presence of Species	Breeding Sites	Prey Base	Space	Other Habitat Parameters	Total	Rank
Coalinga	3	0	3	0	1	7	1
Ciervo Hills	2	1	0	0	2	5	2
Griswold Hills	0	0	0	0	2	2	3

4.2 RANKING POTENTIAL OF INDIVIDUAL PARCELS AS CRITICAL HABITAT FOR SAN JOAQUIN KIT FOX AND BLUNT-NOSED LEOPARD LIZARDS

Assessing the potential of BLM lands as critical habitat for endangered species using parcels lumped into land units has been successful in the past (O'Farrell, et al, 1980; O'Farrell and McCue, 1981). However, the potential of individual parcels or sections is sometimes masked by the overall score of the land unit, which might be greater or less than that of its components. To avoid possible loss of specific information that might be critical to land managers, the potential of each section of BLM land as critical habitat was also tabulated.

Each parcel was subjectively assigned to one of five levels ranging between excellent to no potential as endangered species habitat. Each level was defined using a combination of qualitative and quantitative characteristics.

Level 1, excellent habitat, included sections having large numbers of endangered species, large areas of suitable habitat, few human disturbances or incompatible land uses, and protection from habitat alterations.

Level 2, very good habitat, included sections having moderate populations of endangered species, large areas of suitable habitat, compatible land uses, and protection of the parcel from incompatible uses is in effect or possible.

Level 3, good habitat, included sections where either occasional evidence of endangered species was found or the parcel was adjacent to areas of similar habitat on which observations have been made, and the parcels have fairly large areas of suitable habitat, and compatible land uses.

Level 4, fair or low potential, included sections on which there were no observations of endangered species, acreage was limited, and suitable habitat gave way to rugged relief and more intensive human uses.

Level 5, no potential, included sections on which there were no observations of endangered species, areas of suitable habitat were small or nonexistent, most of the terrain was rugged, and the parcel was disturbed by intensive human uses.

Except for data on actual observations of species or evidence of presence, i.e., den sites, the ranking was based on the collective, subjective judgements of the field personnel. Although suitable insights into what might be adequate endangered species habitat have been developed, the rankings are speculative and should be used for comparative purposes only. Readers are cautioned against making important land management decisions based merely on rankings presented here.

4.2.1 San Joaquin Kit Fox

None of the parcels were judged to be excellent habitat for San Joaquin kit fox, and only three parcels were assigned to Level 2 (Table 18). Eighty

Table 18. Ranking of individual parcels of BLM lands surveyed in 1981 to determine their potential as critical habitat for the San Joaquin kit fox.

Level/ Potential	Section	Township/Range*	Quadrangle
1) Excellent	None		
2) Very Good	10	T17S, R13E	Ciervo Mountain
	32	T16S, R13E	Ciervo Mountain
	20	T21S, R17E	Avenal
3) Good	30	T16S, R13E	Monocline Ridge
	18	T21S, R17E	Avenal
	10	T20S, R15E	Coalinga
	18	T20S, R16E	Coalinga
	6	T20S, R16E	Coalinga
	20	T20S, R16E	Coalinga
	8	T20S, R16E	Coalinga
	34	T20S, R16E	Guijarral Hills
4) Fair	22	T16S, R13E	Monocline Ridge
	24	T17S, R13E	Ciervo Mountain
	30	T21S, R17E	Avenal
	28	T16S, R13E	Monocline Ridge
	26	T16S, R13E	Monocline Ridge
	34	T16S, R13E	Ciervo Mountain
	14	T17S, R13E	Ciervo Mountain
	18	T17S, R14E	Lillis Ranch
	1	T17S, R12E	Idria
	7	T17S, R12E	Idria
	6	T17S, R12E	Idria
	5	T17S, R12E	Idria
5) None	12	T17S, R13E	Ciervo Mountain Range
	22	T17S, R13E	Ciervo Mountain Range

*Mt. Diablo Meridian

percent of the lands were considered to have either fair or good potential as kit fox habitat, since there was limited evidence of the presence of the species on them, and many parcels were small in size and scattered throughout private land holdings. Two parcels in the Ciervo Hills Land Unit had no observable potential as kit fox habitat because of their rugged terrain.

4.2.2 Blunt-Nosed Leopard Lizard

None of the BLM lands were considered to be excellent or very good habitat for blunt-nosed leopard lizards, since moderate to high densities of the species were not observed on many of the parcels in 1981 (Table 19). Blunt-nosed leopard lizards were observed on or near three of the parcels assigned to

Table 19. Ranking of individual parcels of BLM lands surveyed in 1981 to determine their potential as critical habitat for the blunt-nosed leopard lizard.

Level/ Potential	Section	Township/Range	Quadrangle
1) Excellent	None		
2) Very Good	None		
3) Good	18	T21S, R17E	Avenal
	20	T21S, R17E	Avenal
	10	T20S, R15E	Coalinga
	18	T20S, R16E	Coalinga
	6	T20S, R16E	Coalinga
	20	T20S, R16E	Coalinga
	8	T20S, R16E	Coalinga
	34	T20S, R16E	Guijarral Hills
4) Fair	30	T21S, R17E	Avenal
	28	T15S, R12E	Tumey Hills
	33	T15S, R12E	Tumey Hills
	10	T17S, R13E	Ciervo Mountain
	14	T17S, R13E	Ciervo Mountain
	32	T16S, R13E	Ciervo Mountain
	30	T16S, R13E	Monocline Ridge
	34	T16S, R13E	Ciervo Mountain
	28	T16S, R13E	Monocline Ridge
	18	T17S, R14E	Lillis Ranch
	32	T15S, R12E	Tumey Hills
	15	T15S, R12E	Tumey Hills
5) None	26	T16S, R13E	Monocline Ridge
	22	T16S, R13E	Monocline Ridge
	24	T17S, R13E	Ciervo Mountain
	12	T17S, R13E	Ciervo Mountain
	22	T17S, R13E	Ciervo Mountain
	22	T15S, R12E	Tumey Hills
	21	T15S, R12E	Tumey Hills
	29	T15S, R12E	Tumey Hills

Level 3: one was observed in 1981, and six were observed in 1980 (Chesemore, 1981) on Section 18, T21S, R17E. Additional observations were made on lands adjacent to Section 20, T21S, R17E, and Section 10, T20S, R15E, in 1980 (Chesemore, 1981). However, over 70% of the BLM lands were considered to have only fair to no potential as critical habitat for leopard lizards.

4.3 CHARACTERISTICS OF KIT FOX DENS

Data combined for all land units indicated that multiple-hole dens had from 2 to 10 entrances and an overall average of 4.2 (Table 20). Multiple-hole dens in the Coalinga Land Unit had a significantly greater number of entrances than those found in the Ciervo Hills. The one natal den observed in 1981 had three entrances.

Table 20. Average number of entrances and elevational ranges of kit fox dens observed during surveys in 1981.

Land Unit	Number of Entrances $\bar{x}$ ±SE (N)		Den Elevation (m)		Land Unit Elevation Range (m)
	Natal Den	Multiple-Hole	$\bar{x}$ ±SE (N)	Range	
Ciervo Hills	3 (1)	3.1 ±0.3 (10)	672.6 ±25.3 (14)	427-839	293-903
Coalinga	--	5.4 ±0.7 (11)	238.8 ±6.2 (15)	206-284	162-343
Griswold Hills	--	--	--	--	488-720
Total	3 (1)	4.2 ±0.5 (21)	448.2 ±42.8 (29)	206-839	--
Range		2-10			

Kit fox dens were found at elevations between 206 and 839 m (Table 20). In the Ciervo Hills, dens were found at an average elevation of 673 m, and on lands around Coalinga dens were found at an average elevation of 239 m. Average elevations corresponded to elevational ranges surveyed in the respective land units.

Kit fox dens were found on sites having an average slope angle of 15.1°; 90% were found on slopes of less than 25° (Table 21). Multiple-hole dens were found on slopes averaging 15.6°, an angle that was not significantly different from that observed for single-hole dens (17.0°).

Ninety percent of all kit fox dens were found on slopes of hills; few were found on the limited flat land surveyed. The proportion of dens found at various positions on slopes, regardless of elevation or slope angle, was: upper slope, 18%; mid-slope, 43%; lower slope, 29%; and flats, 11%.

Analysis of information on aspect, the compass directions faced by dens, again revealed that dens were not facing quadrants in equal proportions. Orientation of dens was: 0-89°, 56%; 90-179°, 10%; 180-269°, 14%; and 270-359°, 21%. A majority of kit fox dens faced the northeast quadrant.

Table 21. Proportion of San Joaquin kit fox dens tabulated as a function of slope angle (°).

Slope Angle (°)	Dens Found (%)
0-4	7
5-9	21
10-14	10
15-19	38
20-24	14
25-29	7
30-34	3
Mean Slope Angle = 15.1° ±1.4°	

4.4 OBSERVATIONS OF VERTEBRATES

Six species of mammals, eight species of reptiles, and 35 species of birds were observed (Appendix D). Ten additional species of mammals were observed during night spotlight surveys (Appendix C).

Sixteen San Joaquin kit fox were observed: one during ground surveys near Avenal, three along Panoche Road, San Benito County, three during night spotlight surveys along Panoche Road, and nine in the Ciervo Hills (Appendix D).

Sixteen coyotes were observed in the Coalinga Land Unit. Four natal dens of coyotes were located on sections of BLM land west of Coalinga.

San Joaquin antelope ground squirrels, *Ammospermophilus nelsoni*, were observed in the Ciervo Hills (5), Tumey Hills (5), and Coalinga (2) land units. This species has been listed as "rare" by the State of California.

Side-blotched lizards were by far the most numerous (105 sightings) of any reptile species.

California Quail, *Lophortyx californicus*, Chukar, *Alectornis chukar*, Mourning Dove, *Zenaida macroura*, Horned Lark, *Eremophila lapestris*, and Western Meadowlark, *Sturnella neglecta*, were the most numerous birds observed in 1981. Eleven Prairie Falcons, *Falco mexicanus*, were observed in the Ciervo Hills.

5. DISCUSSION

5.1 LAND UNIT RANKINGS

The Coalinga Land Unit received the highest ranking of land units surveyed to determine their potential as critical habitat for the San Joaquin kit fox. This ranking was determined largely by the number of kit fox dens observed and the high relative densities of lagomorph prey seen. Although different parcels were surveyed in 1981, the overall score was almost identical with that assigned following surveys in 1980 (O'Farrell and McCue, 1981). Surprisingly, most of the kit fox dens were observed in the North Dome, Kettleman Hills, which has been heavily disturbed by intensive petroleum developments and chronic grazing.

The small size and scattered nature of the BLM parcels in this land unit may not be conducive to management as critical habitat. Quality of individual parcels as possible kit fox habitat also varied widely. However, evidence of kit fox was sufficient to justify consideration of most parcels of the Coalinga Land Unit as potential critical habitat.

The large number of coyotes observed in the Coalinga Land Unit may have an adverse affect on kit fox populations. Coyotes are known to kill kit fox (O'Farrell and Gilbertson, 1979; Knapp, 1978). However, previous studies (Egoscue, 1962) have also shown that coyotes and kit fox coexist if there are differences in preferred habitats and denning areas, as well as an adequate prey base for both canids.

Areas of low relief in the Ciervo Hills Land Unit were being used for den sites by kit fox, but dens were not found in steep terrain. More rugged areas near dens were probably being used as hunting areas by kit fox. Data gathered during surveys of the nearby Tumey and Panoche Hills also indicated limited use of areas of high releif for kit fox den sites (O'Farrell and McCue, 1981). The only active natal den found in 1981 was observed in the Ciervo Hills. Kit fox dens were also observed on private lands adjacent to parcels of BLM land on which no evidence of kit fox was found. The largest number of kit fox observed during night spotlight surveys were seen in the Ciervo Hills Land Unit. Due to the numerous observations of kit fox and their dens, the Ciervo Hills Land Unit was ranked second in the rating system to evaluate potential critical habitat.

Relative densities of lagomorphs were lowest on this land unit, which suggests that the fox must be using an alternate food source, such as rodents. However, the low numbers of jackrabbits and cottontails may negatively influence the population size and distribution of kit fox in the Ciervo Hills.

The ranking of this land unit was further depressed by the scattered nature of the BLM parcels. As mentioned, public lands interspersed with private parcels may be difficult to manage for endangered species. This is especially true in the Ciervo Hills, where much of the public land consists of high relief that is not conducive to kit fox denning habits.

BLM lands in the Griswold Hills Land Unit were small, scattered, and lacked evidence that they were being used by kit fox. Potential lagomorph prey populations were also depressed. As a result, this land unit received the lowest ranking. Its total score was also the lowest received by any BLM lands that have been surveyed since 1979 (O'Farrell, et al, 1980; O'Farrell and McCue, 1981).

5.2 KIT FOX DENS

Data on physical characteristics of kit fox dens located in 1981 show trends similar to those noted in previous surveys (O'Farrell, et al, 1980; O'Farrell and McCue, 1981). Multiple-hole dens had an average of 4.2 entrances, a value intermediate to averages of 4.7 and 3.5 found in 1979 and 1980, respectively.

Average elevations of kit fox den sites corresponded to the elevational ranges surveyed in land units. Based on three years of observations, the only generalized relationship seems to be that San Joaquin kit fox dens have not been found at elevations below 200 m or above 900 m.

Although a greater percentage of kit fox dens were found on slopes of hills in 1981 as compared with data from 1979 and 1980, the average slope angle where dens were found was less than in previous years. Unlike previous years, no kit fox dens were found in flat terrain, although limited low relief parcels were surveyed in the Coalinga and Griswold Hills land units.

For the third consecutive year, field data indicated that a majority of dens faced the northeast quadrant. BLM lands assigned for survey along the western boundary of the San Joaquin Valley were generally located in hilly terrain oriented towards the east. However, the presence of east-facing slopes does not adequately explain the high proportion of dens facing northeast compared with southeast, and we are still unable to suggest why this is true.

As in previous years, no evidence was gathered in 1981 showing that kit fox den sites were selected because of the presence, density, or growth form of specific vegetation associations.

Two kit fox dens in the Kettleman Hills were found in steel pipes. Likewise, two coyote dens in the East Coalinga Extension Oil Field were also found in steel pipes, and 3 to 4 coyotes were observed in one of these "unique" dens. A third coyote den was found dug into the embankment surrounding a sump. Sandstone bedrock close to the surface may limit the number of available den sites in both areas.

In the past, kit fox dens have been found in culverts (Egoscue, 1956; O'Farrell and Gilbertson, 1979) and steel pipes (Jensen, 1972; Knapp, 1978; O'Farrell and Gilbertson, 1979). The species appears to be able to adapt to some types of human disturbances, such as petroleum field activities, by taking advantage of man-made structures for den sites.

5.3 BLUNT-NOSED LEOPARD LIZARD OBSERVATIONS

The lack of observations of blunt-nosed leopard lizards on BLM lands greatly limits a discussion of the potential of these parcels as critical habitat

for the species. However, most BLM lands near Coalinga appeared visually to have good potential as habitat for leopard lizards, and the single observation of the species was made on one of the parcels. Other lands assigned to Level 3 received their relative ratings because they were relatively large, had low topographic relief, and some were proximate to locations where leopard lizards had been seen in the past.

Steep-sloped parcels bordering Silver Creek and Panoche Creek in the Tumey Hills Land Unit were considered to be poor habitat for blunt-nosed leopard lizards. Major washes within these parcels and the central plateau of the Tumey Hills were potentially fair habitat for the species, although none were observed. Even a doubling of effort, 16 transects per mile, in the central plateau failed to yield a single observation of a leopard lizard.

Having observed only one leopard lizard in 1981, we did not attempt to correlate presence of the species with environmental parameters, such as vegetation types or density, topography, density of rodent burrows, or proximity to human disturbances like grazing or petroleum developments.

The single observation was made when the soil temperature exceeded 50°C. Previous studies had used 46°C (O'Farrell and Kato, 1980) or 50°C (Tollestrup, 1976) as soil temperatures beyond which leopard lizard surveys should not be conducted. Recent studies have indicated, however, that leopard lizard activity is more highly correlated with air rather than ground temperatures (Mullen, 1980; O'Farrell and Kato, 1980), and a significant number of observations are made when soil temperatures exceed 50°C.

5.4 OTHER SPECIES INFORMATION

A fascinating series of disjunct sand dune communities were found on several of the higher peaks of Monocline Ridge, western Fresno County. Sand dunes were located on tops of peaks and rarely extended down the slopes. Vegetation included an overstory of *Ephedra californica*, and a ground cover of *Oryzopsis hymenoides*, *Stipa speciosa*, *Eriastrum pluriflorum*, *Camissonia californica*, *Gutierrezia* sp., *Oenothera hookeri*, *Ambrosia* sp., *Rumex hymenosepalus*, *Haplopappus linearifolius*, *Marrubium vulgare*, and *Chorizanthe perfoliata*.

Numerous small mammal burrows were observed, and *Dipodomys heermanni*, *Dipodomys nitratoides*, and *Onychomys torridus* were live-trapped during an abbreviated sampling schedule. *Sceloporus magister*, *Phrynosoma coronatum*, and *Uta stansburiana* were also captured near the dunes.

Because of their unusual nature, these dune areas warrant further field investigations to describe the flora and fauna endemic to the sandy ridges.

Eleven Prairie Falcons were observed in the Ciervo Hills. The sightings probably represented two to three pairs rather than 11 individuals. The relatively high number of sightings in such a short duration may indicate that the Ciervo Hills are providing above-average habitat for the falcon.

A red fox, *Vulpes vulpes*, was observed during a night spotlight survey east of San Ardo. This may represent a new species record for Monterey County.

6. RECOMMENDATIONS

1. Some parcels of BLM land in the Coalinga and Ciervo Hills Land Units (page 35, Table 18, levels 2 and 3) have potential as critical habitat for the San Joaquin kit fox and should be considered for that designation.

2. A limited amount of BLM land in the Coalinga Land Unit (page 36, Table 19, level 3) has potential as critical habitat for the blunt-nosed leopard lizard, and should be considered for that designation.

3. Some consideration should be given to designating the low relief parcels and major drainages within the Ciervo Hills, and the central plateau of the Tumey Hills as critical habitat for the blunt-nosed leopard lizard, although the potential of these parcels is less than that of public lands near Coalinga.

4. Public land in the Griswold Hills and in the Salinas Valley near San Ardo should not be designated as critical habitat for the San Joaquin kit fox.

5. Grazing, predator trapping and poisoning campaigns, spraying of insecticides to control curly top beet virus, and petroleum developments may adversely affect populations of San Joaquin kit fox, blunt-nosed leopard lizards, and their critical habitats. The BLM should support studies to assess the significance of the impacts and develop practical endangered species management plans.

6. Land exchanges or acquisitions should be considered to consolidate holdings of public lands in areas with potential critical habitat for endangered species.

7. Field studies to describe the ecological significance of sand dune communities on ridgetops in the Ciervo Hills should be initiated as soon as possible.

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APPENDIX A: DATA SUMMARY SHEETS FOR INDIVIDUAL PARCELS OF BLM LANDS SURVEYED FOR THEIR POTENTIAL AS CRITICAL HABITAT

At the end of each survey, data gathered by the field crew was collated and then synthesized to provide a concise summary of all important information gathered for each individual land parcel. Because data from individual parcels might be overlooked or lost when combined with data from other parcels into land unit summaries, they are provided here. The information on individual parcels is arranged by land unit.

Location — The quadrangle title of the USGS 7.5 minute topographic map is provided, along with township/range, and section coordinates. The land unit assigned to each section for this report is given.

Date, Acreage, and Time of Survey — The date the surveys were performed, the total area surveyed within the section, and the time the surveys began and ended (24 hour clock) are given.

Field Crew — The names of field crew members allow cross-referencing with field data books.

Temperature — Air temperatures (°C) recorded at beginning and end of surveys. Temperatures 1 cm above the soil were not recorded during survey for kit fox only (NA).

Topography — Descriptions of drainage patterns, relief, and other topographic features that might affect kit fox are provided.

Habitat — Information on vegetation associations, and species of flora observed, were included in this category. Significant human disturbances were also described here.

Prey Base — The numbers of black-tailed jackrabbits (*Lepus*) and desert cottontails (*Sylvilagus*) observed were tallied in this category to provide an index to prey base.

Evidence of Kit Fox – The total number of each type of den observed by the field crew is given. Den types include: active natal, active multiple hole, inactive multiple hole, active single hole, inactive single hole, and active unique. The category also provides the number of kit fox scats observed in the land parcel.

Evidence of Blunt-Nosed Leopard Lizards – The number of *Crotaphytus silus* observed is recorded. Each sighting is accompanied by information on the sex of the lizard and the air and soil temperatures taken at the spot the lizard was observed.

Estimated Length of Transect – Total length of transects was estimated for parcels surveyed by ridge/wash techniques.

Conclusion – A preliminary evaluation of the significance of this land parcel as kit fox and blunt-nosed leopard lizard critical habitat is given, and important observations that did not apply to above categories are included.

Area Suitable for Endangered Species Inhabitation – Estimates of total area in BLM parcel suitable for inhabitation by San Joaquin kit fox (SJKF) and blunt-nosed leopard lizard (BNLL).

QUADRANGLE: Ciervo Mountain TOWNSHIP/RANGE: T17S, R13E

SECTION: 10 LAND UNIT: Ciervo Hills

DATE OF SURVEY: 4 June 1981 ACREAGE: 640

TIME OF SURVEY: Begin — 0847 End — 1114

FIELD CREW: Hardenbrook, Horwitz, Kato, Johnson

TEMPERATURE (30 cm): Begin — 26.2°C End — 28.6°C
(1 cm): 26.8°C 29.6°C

TOPOGRAPHY: Long, gently sloping hill in center of section, called Peppergrass Flat; bordered on north and south by steep east-running drainages.

HABITAT: *Festuca megalura*, *Bromus rubens*, *Lepidium* sp., *Oryzopsis*, and *Stipa* sp., with sparse *Atriplex polycarpa* and *Gutierrezia* in drainages.

PREY BASE: None observed

EVIDENCE OF KIT FOX: Dens — Active natal — 1
Active multiple hole — 2

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 14.0 km

CONCLUSION: Very good kit fox habitat. Four kit fox observed during night spotlight survey rear western boundary of BLM parcel. Flat central area and major drainages are good potential blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 480 acres
BNLL — 480 acres

QUADRANGLE: Ciervo Mountain TOWNSHIP/RANGE: T17S, R13E

SECTION: 12 LAND UNIT: Ciervo Hills

DATE OF SURVEY: 4 June 1981 ACREAGE: 480

TIME OF SURVEY: Begin — 1244 End — 1403

FIELD CREW: Johnson, Kato

TEMPERATURE (30 cm): Begin — 33.6°C End — 31.0°C
(1 cm): 34.5°C 35.0°C

TOPOGRAPHY: Dominated by major northwest-southeast ridge through center of section.

HABITAT: *Bromus rubens*, *Erodium*, *Oryzopsis*, with scattered *Ambrosia*. Shrub cover primarily of *Ephedra*, *Haplopappus*, and *Eriogonum fasciculatum*.

PREY BASE: *Lepus* — 1

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 7.9 km

CONCLUSION: No potential as habitat for kit fox or blunt-nosed leopard lizard.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 160 acres
BNLL — 100 acres

QUADRANGLE: Ciervo Mountain TOWNSHIP/RANGE: T17S, R13E

SECTION: 14 LAND UNIT: Ciervo Hills

DATE OF SURVEY: 4 June 1981 ACREAGE: 640

TIME OF SURVEY: Begin — 1446 End — 1619

FIELD CREW: Johnson, Horwitz, Hardenbrook, Kato

TEMPERATURE (30 cm): Begin — 34.6°C End — 36.5°C
(1 cm): 36.2°C 41.5°C

TOPOGRAPHY: Dissected by numerous south-running drainages emptying into Arroyo Hondo.

HABITAT: *Bromus rubens*, *Bromus mollis*, *Erodium*, *Lepidium*, with a cover of *Atriplex spinifera*, *Gutierrezia*, and *Haplopappus*.

PREY BASE: *Lepus* — 1
Sylvilagus — 2

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 10.2 km

CONCLUSION: Fair kit fox habitat. Steep drainages in the eastern half marginal. Flat areas and major drainage in southern part of section fair potential blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 400 acres
BNLL — 320 acres

QUADRANGLE: Ciervo Mountain

TOWNSHIP/RANGE: T17S, R13E

SECTION: 22

LAND UNIT: Ciervo Hills

DATE OF SURVEY: 8 June 1981

ACREAGE: 580

TIME OF SURVEY: Begin — 1420 End — 1648

FIELD CREW: Kato, Hardenbrook, Horwitz, Johnson

TEMPERATURE (30 cm): Begin — 32.0°C End — 36.0°C
(1 cm): 35.5°C 38.5°C

TOPOGRAPHY: Steep, rugged slopes draining into Arroyo Hondo.

HABITAT: *Bromus mollis*, *Bromus rubens*, *Bromus diandrus*, and *Hordeum*, with a diverse shrub cover of *Atriplex polycarpa*, *Haplopappus*, *Eriogonum fasciculatium*, and *Yucca whipplei*.

PREY BASE: *Sylvilagus* — 3

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 10.0 km

CONCLUSION: No potential as kit fox or blunt-nosed leopard lizard habitat due to rugged topography. Major drainage system has fair potential as suitable lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 250 acres
BNLL — 100 acres

QUADRANGLE: Ciervo Mountain TOWNSHIP/RANGE: T17S, R13E

SECTION: 24 LAND UNIT: Ciervo Hills

DATE OF SURVEY: 9 June 1981 ACREAGE: 360

TIME OF SURVEY: Begin — 0920 End — 1118

FIELD CREW: Kato, Horwitz, Hardenbrook, Johnson

TEMPERATURE (30 cm): Begin — 23.0°C End — 27.7°C
(1 cm): 25.5°C 31.8°C

TOPOGRAPHY: Steep slopes and drainages oriented northward.

HABITAT: Heavily grazed former burn area. Annuals consist primarily of *Bromus mollis*, *Hordeum*, *Festuca megalura*, and *Erodium*. Sparse localized shrub cover of *Gutierrezia*, *Haplopappus*, and *Atriplex* sp.

PREY BASE: None observed

EVIDENCE OF KIT FOX: Den — Inactive single — 1

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 10.2 km

CONCLUSION: Fair kit fox habitat. Private land to the east appears to be good kit fox habitat. No potential as blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 280 acres
BNLL — 100 acres

QUADRANGLE: Ciervo Mountain TOWNSHIP/RANGE: T16S, R13E

SECTION: 32 LAND UNIT: Ciervo Hills

DATE OF SURVEY: 18 June 1981 ACREAGE: 640

TIME OF SURVEY: Begin — 1110 End — 1157

FIELD CREW: Johnson, Hardenbrook, Horwitz, McCue

TEMPERATURE (30 cm): Begin — 28.0°C End — 31.0°C
(1 cm): 30.0°C 35.0°C

TOPOGRAPHY: Rolling hills, oriented northeast; becomes steeper in the southern portion.

HABITAT: Heavily grazed *Bromus mollis*, *Bromus rubens*, *Festuca megalura*, and *Erodium* sp., sparse cover of *Haplopappus*.

PREY BASE: None observed

EVIDENCE OF KIT FOX: Dens — Active multiple — 5
Active single — 2

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 7.9 km

CONCLUSION: Very good kit fox habitat. Two kit fox observed on night spotlight survey. Three multiple-hole dens observed in privately owned section west of BLM parcel. Fair potential as blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 640 acres
BNLL — 600 acres

QUADRANGLE: Ciervo Mountain TOWNSHIP/RANGE: T16S, R13E

SECTION: 34 LAND UNIT: Ciervo Hills

DATE OF SURVEY: 18 June 1981 ACREAGE: 480

TIME OF SURVEY: Begin — 0917 End — 1042

FIELD CREW: Johnson, Horwitz, Hardenbrook, McCue

TEMPERATURE (30 cm): Begin — 27.5°C End — 29.5°C
(1 cm): 29.5°C 32.0°C

TOPOGRAPHY: Long north-running ridges and drainages.

HABITAT: Heavily grazed *Bromus mollis*, *Festuca megalura*, and *Erodium* sp., *Trichostema ovatum* and *Haplopappus* sp. scattered.

PREY BASE: *Lepus* — 1

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 9.4 km

CONCLUSION: Fair kit fox habitat. No positive sign was observed, however. Fair potential as blunt-nosed leopard lizard habitat, especially flatter areas and gentle slopes.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 400 acres
BNLL — 320 acres

QUADRANGLE: Lillis Ranch TOWNSHIP/RANGE: T17S, R14E

SECTION: 18 LAND UNIT: Ciervo Hills

DATE OF SURVEY: 9 June 1981 ACREAGE: 320

TIME OF SURVEY: Begin — 1156 End — 1345

FIELD CREW: Kato, Hardenbrook, Johnson, Horwitz

TEMPERATURE (30 cm): Begin — 29.0°C End — 33.0°C
(1 cm): 31.2°C 35.2°C

TOPOGRAPHY: BLM land is comprised primarily of rugged slopes drained by Arroyo Hondo.

HABITAT: Annuals consist of *Hordeum*, *Schismus*, *Bromus mollis*, *Festuca megalura*, with *Atriplex lentiformis*, *Eriogonum inflatum*, and *Trichostema ovatum* present.

PREY BASE: *Lepus* —

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 5.9 km

CONCLUSION: Fair kit fox habitat. Flat areas and major drainage fair potential as blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 160 acres
BNLL — 160 acres

QUADRANGLE: Monocline Ridge

TOWNSHIP/RANGE: T16S, R13E

SECTION: 22

LAND UNIT: Ciervo Hills

DATE OF SURVEY: 3 June 1981

ACREAGE: 400

TIME OF SURVEY: Begin — 0900 End — 1127

FIELD CREW: Kato, Johnson, Hardenbrook

TEMPERATURE (30 cm): Begin — 24.8°C End — 29.0°C
(1 cm); 26.5°C 31.2°C

TOPOGRAPHY: Contains two major peaks of Monocline Ridge, bisected by deep ravines.

HABITAT: Sparse annual cover of *Erodium Bromus rubens*, *Schismus*, and *Marrubium*. Shrubs include *Ephedra*, *Gutierrezia*, and *Eriogonum fasciculatum*.

PREY BASE: *Sylvilagus* — 1

EVIDENCE OF KIT FOX: Den — Inactive multiple — 1

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 9.4 km

CONCLUSION: Fair kit fox habitat. Steep slopes throughout parcel are marginal kit fox habitat. No potential as blunt-nosed leopard lizard habitat; large drainage and flat ridges appear most suitable.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 280 acres
BNLL — 140 acres

QUADRANGLE: Monocline Ridge TOWNSHIP/RANGE: T16S, R13E

SECTION: 26 LAND UNIT: Ciervo Hills

DATE OF SURVEY: 3 June 1981 ACREAGE: 400

TIME OF SURVEY: Begin — 1436 End — 1652

FIELD CREW: Kato, Johnson, Hardenbrook

TEMPERATURE (30 cm): Begin — 31.0°C End — 30.0°C
(1 cm): 35.7°C 32.5°C

TOPOGRAPHY: Steep ridges and drainages oriented northeast.

HABITAT: Annual cover consist of *Bromus rubens*, *Schismus arabicus*, and *Erodium*. Sparse shrub cover of *Ephedra* and *Gutierrezia*.

PREY BASE: None observed

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 6.4 km

CONCLUSION: Fair kit fox habitat. Two multiple-hole dens observed on private land within 0.25 km of BLM land. No potential as blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 300 acres
BNLL — 160 acres

QUADRANGLE: Monocline Ridge

TOWSNHIP/RANGE: T16S, R13E

SECTION: 28

LAND UNIT: Ciervo Hills

DATE OF SURVEY: 7 July 1981

ACREAGE: 640

TIME OF SURVEY: Begin — 0750 End — 0906

FIELD CREW: Evans, Hardenbrook, Johnson, McCue

TEMPERATURE (30 cm): Begin — 19.5°C End — 23.0°C

TOPOGRAPHY: Deeply dissected east-facing slope.

HABITAT: Heavily grazed *Bromus mollis*, *Festuca megalura*, and *Erodium* sp., with sparse *Atriplex polycarpa* and *Haplopappus* sp. cover. *Eriogonum fasciculatum* and *Gutierrezia bracteata* were observed on south-facing slopes.

PREY BASE: None observed

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 15.2 km

CONCLUSION: Fair kit fox habitat. One kit fox observed during night spotlight survey along western boundary of section. Fair potential blunt-nosed leopard lizard habitat. Flatter areas and major drainages appear most suitable.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 500 acres
BNLL — 260 acres

QUADRANGLE: Monocline Ridge TOWNSHIP/RANGE: T16S, R13E

SECTION: 30 LAND UNIT: Ciervo Hills

DATE OF SURVEY: 7 July 1981 ACREAGE: 640

TIME OF SURVEY: Begin — 1112 End — 1214

FIELD CREW: Evans, Hardenbrook, Johnson, McCue

TEMPERATURE (30 cm): Begin — 26.5°C End — 28.0°C

TOPOGRAPHY: "Relatively" gentle slopes in the northeast and south central portions bisected by two deep offshoots of Tumey Gulch.

HABITAT: *Festuca megalura* and *Bromus mollis* grassland with scattered *Haplopappus* sp. and *Gutierrezia bracteata*.

PREY BASE: *Lepus* — 1

EVIDENCE OF KIT FOX: Den — Inactive multiple — 2

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 7.0 km

CONCLUSION: Good kit fox habitat, especially gradual slopes and plateaus. Fair potential blunt-nosed leopard lizard habitat excluding steep slopes.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 480 acres
BNLL — 480 acres

QUADRANGLE: Avenal

TOWNSHIP/RANGE: T21S, R17E

SECTION: 18

LAND UNIT: Coalinga

DATE OF SURVEY: 10 June 1981

ACREAGE: 400

TIME OF SURVEY: Begin — 1331 End — 1505

FIELD CREW: Hardenbrook, Horwitz, Johnson

TEMPERATURE (30 cm): Begin — 31.0°C End — 36.5°C
(1 cm): 34.5°C 38.0°C

TOPOGRAPHY: Rolling foothills of the Kettleman Hills emptying out onto "The Washboard."

HABITAT: Annuals consist of *Bromus rubens*, *Festuca megalura*, *Plagiobothrys*, *Salsola*, and *Erodium*; shrubs consist of *Atriplex polycarpa* and *Gutierrezia* in drainages.

PREY BASE: *Lepus* — 41
Sylvilagus — 5

EVIDENCE OF KIT FOX: Den — Inactive multiple — 1

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: Number of observations — 1
Sex — unknown
Temperature at observation —
1 cm below surface — >50.0°C
1 cm above surface — 39.4°C
30 cm above surface — 34.0°C

ESTIMATED LENGTH OF TRANSECT: NA

CONCLUSION: Good kit fox habitat. Good blunt-nosed leopard lizard habitat. One lizard sighted on an abandoned well pad.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 400 acres
BNLL — 400 acres

QUADRANGLE: Avenal TOWNSHIP/RANGE: T21S, R17E

SECTION: 20 LAND UNIT: Coalinga

DATE OF SURVEY: 10 June 1981 ACREAGE: 640

TIME OF SURVEY: Begin — 0749 End — 1134

FIELD CREW: Kato, Hardenbrook, Horwitz, Johnson

TEMPERATURE (30 cm): Begin — 20.6°C End — 29.5°C
(1 cm): 21.5°C 33.0°C

TOPOGRAPHY: Heavily dissected hills, generally oriented north.

HABITAT: Grasses consist of *Bromus rubens* and *Festuca megalura*; forbs consist of *Erodium*, *Salsola*, *Eremocarpus*, *Astragalus*, and *Typha*; and shrubs consist of *Gutierrezia* and *Atriplex polycarpa*.

PREY BASE: *Lepus* — 72
Sylvilagus — 56

EVIDENCE OF KIT FOX: Dens — Active multiple — 3
Inactive multiple — 4
Active single — 1
Inactive single — 1
Active unique — 2
Scats — 2

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: NA

CONCLUSION: Very good kit fox habitat. Two observations of kit fox utilizing man-made structures as "dens" were made. One kit fox was seen during ground surveys. Potentially good blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 640 acres
BNLL — 640 acres

QUADRANGLE: Avenal

TOWNSHIP/RANGE: T21S, R17E

SECTION: 30

LAND UNIT: Coalinga

DATE OF SURVEY: 11 June 1981

ACREAGE: 640

TIME OF SURVEY: Begin — 0831 End — 1054

FIELD CREW: Kato, Horwitz, Johnson, Hardenbrook

TEMPERATURE (30 cm): Begin — 23.5°C End — 30.5°C
(1 cm): 23.5°C 35.0°C

TOPOGRAPHY: Numerous dissected washes, oriented west from central portion of North Dome, Kettleman Hills.

HABITAT: Heavy oil development and grazing. Sparse annual cover of *Bromus rubens*, *Festuca megalura*, and *Erodium*, with sparse shrub cover of *Atriplex polycarpa* and *Gutierrezia*.

PREY BASE: *Lepus* — 23
Sylvilagus — 20

EVIDENCE OF KIT FOX: Den — None observed Scats — 1

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: NA

CONCLUSION: Fair kit fox habitat. Potentially fair blunt-nosed leopard lizard habitat; major drainages are potentially good habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 640 acres
BNLL — 640 acres

QUADRANGLE: Coalinga TOWNSHIP/RANGE: T20S, R16E

SECTION: 6 LAND UNIT: Coalinga

DATE OF SURVEY: 16 June 1981 ACREAGE: 480

TIME OF SURVEY: Begin — 0909 End — 1126

FIELD CREW: Johnson, Hordenbrook, Horwitz, McCue

TEMPERATURE (30 cm): Begin — 30.4°C End — 36.5°C
(1 cm): 30.8°C 44.6°C

TOPOGRAPHY: Rolling hills, interspersed with sumps and ponds.

HABITAT: Dense *Bromus rubens*, *Bromus diandrus*, *Festuca megalura*, *Festuca reflexa*, with *Astragalus*, *Salsola kali*, and *Trichostema* abundant. Shrub cover limited to large patches of *Gutierrezia bracteata*.

PREY BASE: *Lepus* — 1
Sylvilagus — 2

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: NA

CONCLUSION: Potentially good kit fox habitat. However, few small mammal burrow systems were observed and several coyotes (6) were noted. Sandstone bedrock was close to the surface. Good potential as blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 480 acres
BNLL — 480 acres

QUADRANGLE: Coalinga

TOWNSHIP/RANGE: T20S, R16E

SECTION: 8

LAND UNIT: Coalinga

DATE OF SURVEY: 17 June 1981

ACREAGE: 320

TIME OF SURVEY: Begin – 0647 End – 0816

FIELD CREW: Johnson, Horwitz

TEMPERATURE (30 cm): Begin – 23.0°C End – 27.5°C
(1 cm): 21.0°C 28.0°C

TOPOGRAPHY: Rolling hills, tending toward northeast and San Joaquin Valley.

HABITAT: *Festuca megalura*, *Bromus rubens*, *Hordeum*, and *Erodium* grassland, with *Salsola kali* present.

PREY BASE: *Lepus* – 3
Sylvilagus – 4

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: NA

CONCLUSION: Potentially good kit fox and blunt-nosed leopard lizard habitat. Eastern half of section has been cultivated.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF – 320 acres
BNLL – 320 acres

QUADRANGLE: Coalinga TOWNSHIP/RANGE: T20S, R15E

SECTION: 10 LAND UNIT: Coalinga

DATE OF SURVEY: 11 June 1981 ACREAGE: 160

TIME OF SURVEY: Begin – 1430 End – 1556

FIELD CREW: Johnson, Horwitz

TEMPERATURE (30 cm): Begin – 34.0°C End – 34.0°C
(1 cm): 36.5°C 36.0°C

TOPOGRAPHY: Southwest facing slope ending on the flat land of Pleasant Valley.

HABITAT: *Bromus rubens*, *Festuca megalura*, *Hordeum*, and *Salsola kali*.

PREY BASE: *Lepus* – 2

EVIDENCE OF KIT FOX: Den – Inactive multiple – 3 Scats – 1

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: NA

CONCLUSION: Good kit fox habitat (NE ¼ section). Potentially good blunt-nosed leopard lizard habitat also in the NE ¼ section. Southwest ¼ section has been cultivated.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF – 160 acres
BNLL – 160 acres

QUADRANGLE: Coalinga

TOWNSHIP/RANGE: T20S, R16E

SECTION: 18

LAND UNIT: Coalinga

DATE OF SURVEY: 16 June 1981

ACREAGE: 640

TIME OF SURVEY: Begin – 1500 End – 1704

FIELD CREW: Johnson, Hardenbrook, Horwitz, McCue

TEMPERATURE (30 cm): Begin – 37.0°C End – 38.0°C
(1 cm): 40.5°C 41.0°C

TOPOGRAPHY: Gently sloping terrain extending from large hill in center of section.

HABITAT: *Bromus diandrus*, *Bromus rubens*, *Erodium*, and *Avena* grassland, with *Ambrosia*, *Salsola kali*, *Gutierrezia*, and *Amsinckia* locally abundant.

PREY BASE: *Lepus* – 35
Sylvilagus – 5

EVIDENCE OF KIT FOX: Den – None observed Scats – 1

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: NA

CONCLUSION: Potentially good kit fox habitat. However, three coyote natal dens were observed, two of which were in man-made structures. A general lack of small manual burrows was noted in this section. Good potential as blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF – 640 acres
BNLL – 640 acres

QUADRANGLE: Coalinga TOWNSHIP/RANGE: T20S, R16E

SECTION: 20 LAND UNIT: Coalinga

DATE OF SURVEY: 17 June 1981 ACREAGE: 480

TIME OF SURVEY: Begin — 0723 End — 1045

FIELD CREW: Hardenbrook, McCue, Johnson, Horwitz

TEMPERATURE (30 cm): Begin — 20.7°C End — 32.5°C
(1 cm): 22.3°C 34.5°C

TOPOGRAPHY: Gentle west-to-east slope.

HABITAT: Heavily grazed *Bromus* and *Festuca megalura* grassland, with young *Salsola kali* abundant.

PREY BASE: *Lepus* — 6
Sylvilagus — 4

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: NA

CONCLUSION: Potentially good kit fox and blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 480 acres
BNLL — 480 acres

QUADRANGLE: Guijarral Hills TOWNSHIP/RANGE: T20S, R16E

SECTION: 34 LAND UNIT: Coalinga

DATE OF SURVEY: 17 June 1981 ACREAGE: 320

TIME OF SURVEY: Begin — 0954 End — 1057

FIELD CREW: Hardenbrook, McCue

TEMPERATURE (30 cm): Begin — 29.0°C End — 37.7°C
(1 cm): 29.8°C 34.8°C

TOPOGRAPHY: Rolling hills oriented toward the southeast.

HABITAT: Heavily grazed *Bromus rubens* and *Erodium Astragalus* and *Salsola kali* were observed to be abundant.

PREY BASE: *Lepus* — 1

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: NA

CONCLUSION: Potentially good kit fox and blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 320 acres
BNLL — 320 acres

QUADRANGLE: Idria TOWNSHIP/RANGE: T17S, R12E

SECTION: 1 LAND UNIT: Griswold Hills

DATE OF SURVEY: 6 July 1981 ACREAGE: 160

TIME OF SURVEY: Begin — 1445 End — 1523

FIELD CREW: Evans, Hardenbrook, Johnson, McCue

TEMPERATURE (30 cm): Begin — 35.0°C End — 34.5°C

TOPOGRAPHY: Deeply dissected south-facing foothills of the Griswold Hills. Flattens out onto plateau above Vallecitos Valley.

HABITAT: Moderately to heavily grazed *Festuca megalura*, *Bromus rubens*, and *Bromus mollis* in flat areas. Vegetation in hills include *Eriogonum fasciculatum*, *Gutierrezia* sp., *Yucca whippleyi*, and *Ephedra californica*.

PREY BASE: None observed

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: NA

CONCLUSION: Flat to rolling hills at the base of the Griswold Hills appears to be fair kit fox habitat, but no sign was observed.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 120 acres
BNLL — Not surveyed

QUADRANGLE: Idria

TOWNSHIP/RANGE: T17S, R12E

SECTION: 5

LAND UNIT: Griswold Hills

DATE OF SURVEY: 6 July 1981

ACREAGE: 40

TIME OF SURVEY: Begin – 1222 End – 1247

FIELD CREW: Johnson

TEMPERATURE (30 cm): Begin – NA End – NA

TOPOGRAPHY: Gradual east-facing slope, emptying into Silver Creek Valley.

HABITAT: *Bromus mollis*, *Hordeum* sp., *Festuca megalura*, and *Erodium* sp. Shrubs include *Haplopappus* and *Atriplex polycarpa*.

PREY BASE: None observed

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: NA

CONCLUSION: Fair kit fox habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF – 40 acres
BNLL – Not surveyed

QUADRANGLE: Idria

TOWNSHIP/RANGE: T17S, R12E

SECTION: 6

LAND UNIT: Griswold Hills

DATE OF SURVEY: 6 July 1981

ACREAGE: 520

TIME OF SURVEY: Begin — 1053 End — 1257

FIELD CREW: Evans, Hardenbrook, McCue

TEMPERATURE (30 cm): Begin — 33.0°C End — 38.0°C
(1 cm): NA NA

TOPOGRAPHY: Very steep, deeply dissected ridges and washes draining southeast into Silver Creek.

HABITAT: *Bromus* spp. and *Festuca megalura* with scattered *Juniperus* in rolling southern portions.

PREY BASE: *Lepus* — 2
Sylvilagus — 1

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: NA

CONCLUSION: Poor kit fox habitat in the rugged northern half of the parcel; fair kit fox habitat in southern half.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 260 acres
BNLL — Not surveyed

QUADRANGLE: Idria

TOWNSHIP/RANGE: T17S, R12E

SECTION: 7

LAND UNIT: Griswold Hills

DATE OF SURVEY: 6 July 1981

ACREAGE: 90

TIME OF SURVEY: Begin — 1059 End — 1146

FIELD CREW: Johnson

TEMPERATURE (30 cm): Begin — 33.5°C End — NA

TOPOGRAPHY: Rolling, east-facing hills.

HABITAT: Primarily a grazed *Bromus/Hordeum* grassland.

PREY BASE: None observed

EVIDENCE OF KIT FOX: None observed

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: NA

CONCLUSION: Potentially fair kit fox habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — 90 acres
BNLL — Not surveyed

QUADRANGLE: Tumey Hills TOWNSHIP/RANGE: T15S, R12E

SECTION: 15 LAND UNIT: Tumey Hills

DATE OF SURVEY: 2 June 1981 ACREAGE: 60

TIME OF SURVEY: Begin — 1619 End — 1645

FIELD CREW: Hardenbrook

TEMPERATURE (30 cm): Begin — 28.2°C End — 31.0°C
(1 cm): 29.0°C 32.0°C

TOPOGRAPHY: Steep ridge in southeast corner of BLM parcel, major drainage runs north through center of section.

HABITAT: Annuals consist of *Festuca megalura*, *Bromus mollis*, *Bromus rubens*, and *Hordeum*; sparse shrub cover of *Atriplex spinifera*, *Gutierrezia*, and *Haplopappus*.

PREY BASE: Not surveyed

EVIDENCE OF KIT FOX: Not surveyed for kit fox

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 1.0 km

CONCLUSION: The flat part of this section is potentially fair blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — Not surveyed
BNLL — 30 acres

QUADRANGLE: Tumey Hills

TOWNSHIP/RANGE: T15S, R12E

SECTION: 21

LAND UNIT: Tumey Hills

DATE OF SURVEY: 2 June 1981

ACREAGE: 480

TIME OF SURVEY: Begin — 0950 End — 1511

FIELD CREW: Hardenbrook, Horwitz

TEMPERATURE (30 cm): Begin — 28.2°C End — 29.0°C
(1 cm): 29.0°C 30.5°C

TOPOGRAPHY: Steep northwest facing slope along western boundary of parcel; deep drainage in southwest; ridge in each central portion.

HABITAT: *Bromus rubens*, *Bromus mollis*, *Festuca megalura*, with shrub cover of *Atriplex spinifera* and *Haplopappus*.

PREY BASE: Not surveyed

EVIDENCE OF KIT FOX: Not surveyed for kit fox

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 7.6 km

CONCLUSION: No potential as blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — Not surveyed
BNLL — 40 acres

QUADRANGLE: Tumey Hills TOWNSHIP/RANGE: T15S, R12E

SECTION: 22 LAND UNIT: Tumey Hills

DATE OF SURVEY: 2 June 1981 ACREAGE: 260

TIME OF SURVEY: Begin — 1540 End — 1619

FIELD CREW: Hardenbrook

TEMPERATURE (30 cm): Begin — 30.0°C End — 31.0°C
(1 cm): 31.2°C 32.0°C

TOPOGRAPHY: Moderate to steep-sloped hills.

HABITAT: Average annual cover of *Festuca megalura*, *Bromus rubens*, *Bromus diandrus*, *Erodium* sp., *Plagiobothrys* sp., and *Bromus mollis*. Sparse shrub cover of *Atriplex lentiformis*, *Eriogonum inflatum*, and *Eriogonum gracillimum* present.

PREY BASE: Not surveyed

EVIDENCE OF KIT FOX: Not surveyed for kit fox

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 1.4 km

CONCLUSION: No potential as blunt-nosed leopard lizard habitat. The major drainage appears most suitable.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — Not surveyed
BNLL — 40 acres

QUADRANGLE: Tumey Hills

TOWNSHIP/RANGE: T15S, R12E

SECTION: 28

LAND UNIT: Tumey Hills

DATE OF SURVEY: 2 June 1981; 17 June 1981

ACREAGE: 360

TIME OF SURVEY: Begin — 1344; 1422 End — 1445; 1540

FIELD CREW: Johnson, Hardenbrook, Horwitz, McCue

TEMPERATURE (30 cm): Begin — 29.0°C End — 37.0°C
(1 cm): 31.5°C 42.0°C

TOPOGRAPHY: Rolling hills on plateau in east portion of section. Steep westwart flowing drainages and ridges along western border.

HABITAT: Heavily grazed *Bromus rubens*, *Erodium* sp., and *Festuca megalura*; scattered shrub cover of *Atriplex polycarpa*.

PREY BASE: Not surveyed

EVIDENCE OF KIT FOX: Not surveyed for kit fox

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 6.5 km

CONCLUSION: The steep-sloped western areas have no potential as blunt-nosed leopard lizard habitat. The central plateau is potentially fair blunt-nosed leopard lizard habitat. Three multiple entrance kit fox dens not observed in 1980 were noted.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — Not surveyed
BNLL — 200 acres

QUADRANGLE: Tumey Hills TOWNSHIP/RANGE: T15S, R12S

SECTION: 29 LAND UNIT: Tumey Hills

DATE OF SURVEY: 2 June 1981 ACREAGE: 320

TIME OF SURVEY: Begin — 0953 End — 1250

FIELD CREW: Kato, Johnson, Horwitz

TEMPERATURE (30 cm): Begin — 27.5°C End — 32.5°C
(1 cm): 28.5°C 33.8°C

TOPOGRAPHY: Steep west-flowing drainages along eastern border. East-flowing washes and rolling hills along western border. Section is bisected by privately-owned Silver Creek Valley.

HABITAT: Grasses consist of *Hordeum*, *Bromus* sp., and *Festuca megalura*; *Eastwoodia*, *Gutierrezia*, and *Atriplex spinifera* on ridges.

PREY BASE: Not surveyed

EVIDENCE OF KIT FOX: Not surveyed for kit fox

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 13.0 km

CONCLUSION: No potential as blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — Not surveyed
BNLL — 75 acres

QUADRANGLE: Tumey Hills

TOWNSHIP/RANGE: T15S, R12E

SECTION: 32

LAND UNIT: Tumey Hills

DATE OF SURVEY: 1 June 1981; 2 June 1981

ACREAGE: 240

TIME OF SURVEY: Begin — 1447; 0926 End — 1625; 1007

FIELD CREW: Hardenbrook, Horwitz, Johnson, Kato

TEMPERATURE (30 cm): Begin — 26.5°C End — 34.2°C
(1 cm): 34.5°C 36.0°C

TOPOGRAPHY: BLM land dominated by northwest-flowing drainages, emptying into Silver Creek.

HABITAT: Annual cover consist of *Bromus rubens*, *Bromus mollis*, *Hordeum*, and *Salsola*. Shrub cover consist of *Atriplex polycarpa*, *Atriplex spinifera*, and *Atriplex lentiformis*.

PREY BASE: Not surveyed

EVIDENCE OF KIT FOX: Not surveyed for kit fox

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: 20.0 km

CONCLUSION: Potentially fair blunt-nosed leopard lizard habitat, especially in large drainages.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — Not surveyed
BNLL — 100 acres

QUADRANGLE: Tumey Hills TOWNSHIP/RANGE: T15S, R12E

SECTION: 33 LAND UNIT: Tumey Hills

DATE OF SURVEY: 19 June 1981 ACREAGE: 120

TIME OF SURVEY: Begin — 0950 End — 1050

FIELD CREW: Johnson, Hardenbrook, Horwitz, McCue

TEMPERATURE (30 cm): Begin — 30.5°C End — 33.3°C
(1 cm): 33.0°C 39.0°C

TOPOGRAPHY: Rolling hills generally running eastward on central plateau. Steep west-flowing drainage in western Section 33.

HABITAT: Heavily grazed *Festuca megalura*, *Bromus rubens*, *Bromus mollis*, *Erodium*, *Atriplex polycarpa*, and *Haplopappus* scattered in drainages.

PREY BASE: Not surveyed

EVIDENCE OF KIT FOX: Not surveyed for kit fox

EVIDENCE OF BLUNT-NOSED LEOPARD LIZARD: None observed

ESTIMATED LENGTH OF TRANSECT: NA

CONCLUSION: Western half has no potential as blunt-nosed leopard lizard habitat. Eastern portion of section consists of rolling hills and has fair potential as blunt-nosed leopard lizard habitat.

AREA SUITABLE FOR ENDANGERED SPECIES INHABITATION: SJKF — Not surveyed
BNLL — 120 acres

APPENDIX B: KIT FOX DEN ANALYSIS SHEETS OF SIGNIFICANT INFORMATION FOUND WITHIN EACH LAND UNIT

Den Code Number — Each den received an individual code number to facilitate cross-referencing with field notebooks and map references. The code consists of the section number, followed by the transect line number, and den number. Transect lines were number 1 through 8 from west to east or north to south, depending on how the transects were arranged within a land parcel. The den number was the cumulative number of dens found to that point on a specific transect.

Category — Dens were classified using the following abbreviations. AN — active natal den, AM — active multiple-hole den, AS — active single-hole den, IM — inactive multiple-hole den, IS — inactive single-hole den, and UN — active unique den, Active dens had positive evidence of use by fox in 1981; inactive dens did not. Natal dens had multiple holes, matted vegetation, and prey remains. Unique dens were in man-made structures.

Number of Holes — The number of holes for each den was counted.

Slope Position — Position of dens on slopes was noted as follows: U — upper slope, M — mid-slope, L — lower slope, and F — found in the flats away from a slope.

Aspect — The compass direction (in degrees) faced by the den was determined.

Slope Angle — Slope angles (in degrees) where dens were found were measured with a clinometer.

Elevation — Presented here in both English and metric units.

Vegetation Dominants — The dominant ground cover and shrubs associated with individual den sites were noted using the following species key: Assp — *Astragalus* sp., Atpo — *Atriplex polycarpa*, Brmo — *Bromus mollis*, Brru — *Bromus rubens*, Brte — *Bromus tectorum*, Epca — *Ephedra californica*, Erci — *Erodium cicutarium*, Erfa — *Eriogonum fasciculatum*, Erin — *Eriogonum inflatum*, Erse — *Eremocarpus setigerus*, Feme — *Festuca megalura*, Gubr — *Gutierrezia bracteata*, Hasp — *Haplopappus* sp., Hesp — *Hemizonia* sp., Hosp — *Hordeum* sp., Lesp — *Lepidium* sp., Masp — *Marrubium* sp., Saka — *Salsola kali*, Scar — *Schismus arabicus*, and Trov — *Trichostema ovatum*.

Animal Sign — Where observed at a den, the following types of information were noted with a plus (+): fox scats, fox tracks, prey remains, vegetation matted by fox (particularly pups), presence of owls (slices, pellet prey), other mammals (observed, tracks, scats), and dirt berms due to animal digging. The following abbreviations were used in the other animals category: BA — badger, BO — burrowing owl, and UR — unidentified rodent.

Human Activities — The types and degrees of human activities proximate to the den sit were summarized. The following abbreviations indicate human activities: BN — burn, DR — dirt road, FLD — field, GR — grazing, HWY — highway, OR — orchard, PL — pipeline, PLFD — plowed field, PWR — powerlines, RD — road, SMP — sump, TNK — tank, UD — undisturbed, WL — well, and WP — well pad.

Den analysis sheets in this Appendix are presented for individual land units. Within land units the den analyses are arranged by section, transect number, and den order within individual transects.

Ciervo Hills Land Unit

Den Code Number	22-2-1	30-8-1	30-8-2	32-7-1	32-7-2	32-7-3	32-7-4	32-7-5	32-7-6	32-1-1	10-5-1
Township/Range	T16S R13E	T16S R13E	T16S R13E	T16S R13E	T16S R13E	T16S R13E	T16S R13E	T16S R13E	T16S R13E	T16S R13E	T17S R13E
Category	IM	IM	IM	AM	AM	AM	AS	AS	AM	AM	AM
Number of Holes	5	4	3	4	4	2	1	1	3	2	2
Slope Position	U	M	M	L	L	M	M	L	U	L	M
Aspect (degrees)	120	140	312	26	22	263	266	328	274	70	306
Slope Angle (degrees)	22	17	11	13	15	15	11	9	17	22	30
Elevation (ft) (m)	1400 427	2240 683	2240 683	2380 726	2380 726	2340 714	2360 720	2320 708	2340 714	2750 839	2110 644
Vegetation Dominants	Brru Scar Feme Atpo Erfa	Erci Feme Brru Scar	Erci Brmo Brru Hesp	Feme Brru Trov Erci	Feme Brru Brmo Trov	Feme Brru Brmo Erci	Erci Brru Feme Saka	Feme Brru Erci	Erci Feme Brru	Brru Feme Erci Hasp	Brmo Feme Erci Lesp
Animal Sign:											
Fox Scats	+	+		+	+	+	+	+	+	+	+
Fox Tracks										+	
Prey Remains				+	+	+	+		+		+
Matted Vegetation				+	+	+	+		+		
Other Animals	BA				UR	UR	UR	UR			
Dirt Berms	+	+	+	+	+	+	+	+	+	+	+
Human Activities	GR BN	GR	GR	GR DR	GR DR	GR DR	GR DR	GR DR	GR DR	GR DR	GR

Ciervo Hills Land Unit (continued)

Den Code Number	10-6-1	10-6-2	24-6-1								
Township/Range	T17S R13E	T17S R13E	T17S R13E								
Category	AM	AN	IS								
Number of Holes	2	3	1								
Slope Position	L	U	U								
Aspect (degrees)	60	86	54								
Slope Angle (degrees)	19	16	27								
Elevation (ft) (m)	2090 637	2080 634	1840 561								
Vegetation Dominants	Feme Brru Erci Masp	Brru Brmo Feme Erci	Brmo Erci Erin								
Animal Sign:											
Fox Scats	+	+									
Fox Tracks	+	+									
Prey Remains		+	+								
Matted Vegetation		+									
Other Animals											
Dirt Berms	+	+									
Human Activities	GR	GR	GR								

Coalinga Land Unit

Den Code Number	10-7-1	10-8-1	10-8-2	18-8-1	20-1-1	20-2-1	20-2-2	20-2-3	20-2-4	20-4-1	20-4-2
Township/Range	T20S R15E	T20S R15E	T20S R15E	T22S R17E	T21S R17E	T21S R17E	T21S R17E	T21S R17E	T21S R17E	T21S R17E	T21S R17E
Category	IM	IM	IM	IM	IS	AM	AM	AM	IM	IM	IM
Number of Holes	2	7	2	4	1	6	3	5	6	7	7
Slope Position	M	M	M	M	M	NA	F	F	F	U	L
Aspect (degrees)	230	154	338	256	16	360	4	5	4	73	44
Slope Angle (degrees)	18	7	23	4	18	25	5	5	5	18	19
Elevation (ft) (m)	925 282	930 284	825 252	675 206	725 221	725 221	715 218	715 218	725 221	825 252	810 247
Vegetation Dominants	Brru Feme	Feme Brru	Feme Brru	Brru Feme Erse	Brru Hosp Saka Erse	Brru Erci Saka	Brru Erse Erci	Brru Erci Feme Saka	Brru Feme Saka Erse	Feme Brru Assp Erci	Feme Brru Erci
Animal Sign:											
Fox Scats			+	+	+	+	+	+	+	+	+
Fox Tracks								+			
Prey Remains					+		+			+	
Matted Vegetation				+						+	
Other Animals		UR	BA	BO							
Dirt Berms	+	+	+	+	+	+	+	+	+	+	+
Human Activities	UD	UD	HWY	RD PLFD	RD	SMP WL	DR	DR FLD OR	DR WP	RD	RD

Coalinga Land Unit (continued)

Den Code Number	20-4-3	20-4-4	20-5-1	20-8-1							
Township/Range	T21S R17E	T21S R17E	T21S R17E	T21S R17E							
Category	IM	AU	AS	AU							
Number of Holes	10	2	1	2							
Slope Position	M	L	L	M							
Aspect (degrees)	39	291	26	12							
Slope Angle (degrees)	18	1	20	9							
Elevation (ft) (m)	817 249	830 253	800 244	700 214							
Vegetation Dominants	Femè Brru Erci Scar	Brru Feme Assp	Brru Erci Atpo	Brru Feme Saka							
Animal Sign:											
Fox Scats	+	+		+							
Fox Tracks			+								
Prey Remains	+	+									
Matted Vegetation	+										
Other Animals											
Dirt Berms	+		+								
Human Activities	RD	WL PL	PL DR WL	TNK PL							

Private land adjacent to BLM land

Den Code Number	29-1-1	29-1-2	31-1-1	31-1-2	31-1-3	35-2-1	35-3-1	9-1-1			
Township/Range	T16S R13E	T16S R13E	T16S R13E	T16S R13E	T16S R13E	T16S R13E	T16S R13E	T12S R13E			
Category	AM	IM	AM	IM	AM	IM	AM	AN			
Number of Holes	4	3	2	3	2	4	3	1			
Slope Position	U	M	M	U	L	U	U	M			
Aspect (degrees)	61	79	290	260	106	58	30	71			
Slope Angle (degrees)	27	13	22	26	17	16	19	18			
Elevation (ft) (m)	2580 787	2480 756	2640 805	2730 833	2660 811	1860 567	1880 573	2600 793			
Vegetation Dominants	Brru Brmo Feme Hosp	Brru Erci Feme Atpo	Brru Erci Feme	Erci Brmo Feme Hosp	Brru Erci Gubr Atpo	Erci Scar Brru Saka	Feme Brru Erci Epca	Feme Brmo			
Animal Sign:											
Fox Scats	+		+	+	+	+	+	+			
Fox Tracks			+					+			
Prey Remains	+	+	+					+			
Matted Vegetation								+			
Other Animals				BO	UR						
Dirt Berms	+	+	+	+	+	+	+	+			
Human Activities	GR DR	GR DR	GR DR	GR	DR	GR	UD	RD			

New dens on BLM land previously surveyed

Den Code Number	28-2-1	28-6-1	28-5-1	2-2-1							
Township/Range	T15S R12E	T15S R12E	T15S R12E	T20S R15E							
Category	AM	IM	AM	UN							
Number of Holes	6	3	3	2							
Slope Position	M	M	M	NA							
Aspect (degrees)	144	94	80	351							
Slope Angle (degrees)	5	10	14	15							
Elevation (ft) (m)	1200 366	1200 366	1200 366	1010 308							
Vegetation Dominants	Brru Feme	Brmo Feme Brru	Brru Feme Erci Brmo	Brte Feme Hosp Brru							
Animal Sign:											
Fox Scats	+		+	+							
Fox Tracks	+		+								
Prey Remains				+							
Matted Vegetation											
Other Animals			BO	UR							
Dirt Berms	+	+	+	+							
Human Activities	UD	UD	UD	RD PWR							

APPENDIX C: VERTEBRATES OBSERVED DURING NIGHT SPOTLIGHT SURVEYS OF BLM LANDS IN 1981

Information is presented both in a table summarizing vertebrates observed on six spotlight surveys, and in individual night survey sheets prepared following each survey. The night survey sheets include information on date, route, personnel conducting survey, start and finish time, mileage, speed, weather conditions, and total observations.

Vertebrates observed during night spotlight surveys of potential kit fox habitat in the Ciervo Hills, Panoche Valley, Vallecitos Valley, Lynch Canyon, and Coalinga area in 1981

Species	Survey Locations						Total
	A	B	C	D	E	F	
San Joaquin kit fox	3	9	--	--	--	--	12
Black-tailed jackrabbit	17	5	51	8	1	3	85
Desert cottontail	18	14	24	50	1	10	117
Coyote	1	--	5	1	--	--	7
Red fox	--	--	--	--	1	--	1
Bobcat	--	--	--	2	2	--	4
Striped skunk	1	--	--	--	2	--	3
Raccoon	--	--	--	--	1	2	3
Housecat	--	--	--	1	--	--	1
Boar	--	--	--	--	13	--	13
Mule deer	--	--	--	--	1	1	2
Kangaroo rat	1	47	1	3	8	--	60
Pocket mouse	--	--	1	--	--	--	1
Deer mouse	--	1	--	--	--	--	1
Barn Owl	1	--	--	4	--	--	5
Burrowing Owl	--	3	--	--	--	--	3
Short-Eared Owl	--	--	--	2	--	--	2
Mourning Dove	1	--	--	--	--	--	1
Western Meadowlark	--	1	--	--	--	--	1
Unidentified bats	2	--	--	--	--	--	2
Unidentified rodents	2	--	--	--	--	--	2
Unidentified canids	1	--	1	--	--	--	2
Unidentified owls	--	--	--	2	--	--	2
Unidentified bird	--	--	--	--	--	1	1
Unidentified eyeshine	--	6	2	1	--	3	12
Gopher snake	--	1	--	--	--	--	1

A — Panoche Road, 18.6 miles
B — Ciervo Hills, from Hudson Avenue, 14.0 miles
C — North Coalinga (Palmer Avenue, Calveras Avenue), 12.9 miles
D — Cantua Creek, 9.1 miles
E — San Ardo (Lynch Canyon), 7.2 miles
F — New Idria Road, 7.9 miles

DATE: 1 June 1981

ROUTE: Panoche Road

PERSONNEL: Kato, Hardenbrook, Johnson

TIME: Starting – 2030 Finishing – 2310 Total – 2 hours 40 minutes

MILEAGE: Starting – 332.7 Finishing – 351.3 Total – 18.6 miles

SPEED: 10-15 mph

WEATHER: Temperature – 26°C
Cloud Cover – High, Overcast
Wind – Gusty from NW
Moon – New Moon

Species	Total
Jackrabbits	17
Cottontails	18
Kangaroo rat	1
Kit fox	3
Coyote	1
Striped skunk	1
Barn Own	1
Mourning Dove	1
Unidentified bats	2
Unidentified rodents	2
Unidentified canid	1

DATE: 4 June 1981

ROUTE: Ciervo Hills — Hudson Avenue to Peppergrass Flat

PERSONNEL: Kato, Hardenbrook, Johnson, Florence

TIME: Starting — 2052 Finishing — 2355 Total — 3 hours 3 minutes

MILEAGE: Starting — 711.3 Finishing — 725.3 Total — 14.0 miles

SPEED: 10-15 mph

WEATHER: Temperature — 30.5°C
Cloud Cover — None
Wind — None
Moon — None, two nights after new moon

Species	Total
Jackrabbits	5
Cottontails	14
Kangaroo rats	47
Deer mouse	1
Kit fox	9
Western Meadowlark	1
Unidentified eyeshine	6
Gopher snake	1
Burrowing Owls	3

DATE: 16 June 1981

ROUTE: North Coalinga — Palmer Avenue to Calveras Avenue

PERSONNEL: McCue, Johnson

TIME: Starting — 2109 Finishing — 2255 Total — 1 hour 56 minutes

MILEAGE: Starting — 77.3 Finishing — 92.7 Total — 12.9 miles

SPEED: 10-15 mph

WEATHER: Temperature — 31°C
Cloud Cover — Slight
Wind — Light from NE
Moon — Full

Species	Total
Jackrabbits	51
Cottontails	24
Kangaroo rat	1
Pocket mouse	1
Unidentified eyeshine	2
Coyotes	5
Unknown canid	1

DATE: 17 June 1981

ROUTE: Cantua Creek

PERSONNEL: McCue, Hardenbrook, Korvalin

TIME: Starting – 2110 Finishing – 2230 Total – 1 hour 20 minutes

MILEAGE: Starting – 97.6 Finishing – 106.7 Total – 9.1 miles

SPEED: 10-15 mph

WEATHER: Temperature – NA
Cloud Cover – None
Wind – Light from North
Moon – Full

Species	Total
Jackrabbits	8
Cottontails	50
Kangaroo rats	3
Bobcats	2
Coyote	1
House cat	1
Barn Owls	4
Short-Eared Owls	2
Unidentified owls	2
Unknown	1

DATE: 22 June 1981

ROUTE: San Ardo – Lynch Canyon

PERSONNEL: McCue

TIME: Starting – 2130 Finishing – 2300 Total – 1 hour 30 minutes

MILEAGE: Starting – 75.2 Finishing – 82.4 Total – 9.0 miles

SPEED: 10-15 mph

WEATHER: Temperature – NA
Cloud Cover – None
Wind – Light
Moon – None, two nights before last quarter

Species	Total
Jackrabbit	1
Cottontail	1
Kangaroo rats	8
Striped skunks	2
Red fox	1
Raccoon	1
Boars	13
Bobcats	2
Mule deer	1

DATE: 7 July 1981

ROUTE: New Idria Road

PERSONNEL: McCue, Evans, Hardenbrook, Johnson

TIME: Starting — 2119 Finishing — 2155 Total — 38 minutes

MILEAGE: Starting — 733.9 Finishing — 741.1 Total — 7.2 miles

SPEED: 10-15 mph

WEATHER: Temperature — 20.2°C
Cloud Cover — None
Wind — Light from East
Moon — Half, one night before first quarter

Species	Total
Jackrabbits	3
Cottontails	10
Raccoons	2
Mule deer	1
Unidentified owl	1
Unidentified bird	1
Unidentified eyeshine	3

APPENDIX D: NUMBER OF MAMMALS, REPTILES, AND BIRDS OBSERVED ON BLM LANDS SURVEYED AS POTENTIAL SAN JOAQUIN KIT FOX CRITICAL HABITAT IN 1981

Information is presented in two tables. The first includes tallies of all vertebrates observed during ground surveys of four BLM land units. The second table is a complete annotated listing of direct observations of kit fox made during the study.

Vertebrate tallies

Species	Land Unit				Total
	Ciervo Hills	Coalinga	Griswold Hills	Tumey Hills	
MAMMALS					
Lepus californicus Black-tailed jackrabbit	9	175	2	1	187
Sylvilagus audubonii Desert cottontail	6	77	1	--	84
Spermophilus beecheyi California ground squirrel	5	15	3	1	24
Ammospermophilus nelsoni San Joaquin antelope ground squirrel	5	2	--	5	12
Vulpes macrotis mutica San Joaquin kit fox	--	1	--	--	1
Canis latrans Coyote	--	16	--	--	16
REPTILES					
Crotaphytus silus Blunt-nosed leopard lizard	--	1	--	--	1
Sceloporus magister Desert spiny lizard	6	--	--	--	6
Uta stansburiana Side-blotched lizard	76	20	--	9	105
Phrynosoma coronatum Coast horned lizard	6	--	--	--	6

Vertebrate tallies (continued)

Species	Land Unit				Total
	Ciervo Hills	Coalinga	Griswold Hills	Tumey Hills	
REPTILES (continued)					
Cnemidophorus tigris Western whiptail	3	--	--	--	3
Arizona elegans Glossy snake	--	--	1	--	1
Tantilla planiceps Western blackheaded snake	1	--	--	--	1
Crotalus viridus Western rattlesnake	1	--	--	--	1
BIRDS					
Anas platyrhynchos Mallard	--	20	--	--	20
Anas acuta Pintail	--	2	--	--	2
Cathartes aura Turkey Vulture	--	1	--	--	1
Elanus leucurus White-Tailed Kite	--	--	1	--	1
Buteo jamaicensis Red-Tailed Hawk	11	12	2	--	25
Aquila chrysaetos Golden Eagle	--	--	--	2	2
Circus cyaneus Marsh Hawk	3	--	--	1	4
Falco mexicanus Prairie Falcon	11	--	--	--	11
Falco sparverius American Kestrel	--	7	10	--	17
Lophortyx californicus California Quail	85	81	20	4	190
Alectoris chukar Chukar	133	10	25	--	168
Charadrius vociferus Killdeer	--	11	2	--	13
Recurvirostra americana American Avocet	--	19	--	--	19

Vertebrate tallies (continued)

Species	Land Unit				Total
	Ciervo Hills	Coalinga	Griswold Hills	Tumey Hills	
BIRDS (continued)					
Himantopus mexicanus Black-Necked Stilt	--	10	--	--	10
Zenaida macroura Mourning Dove	19	123	14	8	164
Tyto alba Barn Owl	--	--	1	--	1
Athene cunicularia Burrowing Owl	7	11	--	--	18
Tyrannus verticalus Western Kingbird	1	2	--	1	4
Sayornis saya Say's Phoebe	5	2	--	--	7
Pica pica Black-Billed Magpie	--	--	2	--	2
Eremophila alpestris Horned Lark	54	12	--	96	162
Petrochelidon pyrrhonota Cliff Swallow	--	1	--	24	25
Corvus corax Common Raven	7	45	--	20	72
Parus rufescens Chestnut-Backed Chickadee	--	--	2	--	2
Chamaea fasciata Wrentit	--	--	1	--	1
Salpinctes obsoletus Rock Wren	27	--	2	15	44
Mimus polyglottos Mockingbird	1	11	--	3	15
Lanius ludovicianus Loggerhead Shrike	22	22	7	6	57
Sturnus vulgaris Starling	--	1	--	--	1
Sturnella neglecta Western Meadowlark	29	69	2	12	112
Euphagus cyanocephalus Brewer's Blackbird	10	3	1	--	14

Vertebrate tallies (continued)

Species	Land Unit				Total
	Ciervo Hills	Coalinga	Griswold Hills	Tumey Hills	
BIRDS (continued)					
Carpodacus mexicanus House Finch	1	2	--	--	3
Chondestes grammacus Lark Sparrow	9	--	--	3	12
Amphispiza belli Sage Sparrow	4	--	--	5	9
Zonotrichia leucophrys White-Crowned Sparrow	--	3	--	--	3

Direct observations of San Joaquin kit fox made during the 1981 inventory of BLM lands

Date	Location
01 June 1981	Night spotlight survey observations along Panoche Road, San Benito County, California: 2 observed at natal den 2.5 miles west of Fresno/San Benito County line; one observed 3.4 miles west of county line.
04 June 1981	Night spotlight observations in the Ciervo Hills. Mileages from first gate at Lower Hudson Avenue: 6.2, 7.4 (2), 9.6 (2), 12.5 (3), and 12.9; at total of nine kit fox was observed.
10 June 1981	Kit fox observed during ground transects, 1030 hours, NW/NW Section 20 (T21S, R17E), 5 miles north of Avenal, California; entered 8 inch pipe in berm of oil sump.
07 July 1981	Kit fox observed near Panoche Road, NE/SW Section 27 (T15S, R11E) San Benito County, California; entered culvert under road, 2020 hours.
15 July 1981	Two kit fox (one pup) at entrance to culvert under Panoche Road, NW Section 35 (T15S, R11E) San Benito County, California, 0700 hours.

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